APPENDIX C
ECONOMIC ANALYSIS OF STORM DAMAGE REDUCTION WITH RECREATION BENEFITS

SEGMENT II

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TABLE OF CONTENTS

LIST OF TABLES

Table No.

APPENDIX C
ECONOMIC ANALYSIS OF STORM DAMAGE REDUCTION
WITH RECREATION BENEFITS

SEGMENT II

TABLE OF CONTENTS

LIST OF TABLES
(cont.)

Table No.

APPENDIX C
ECONOMIC ANALYSIS OF STORM DAMAGE REDUCTION
WITH RECREATION BENEFITS

SEGMENT II

TABLE OF CONTENTS
(cont'd)

LIST OF FIGURES

LIST OF APPENDICES

APPENDIX C
ECONOMIC ANALYSIS OF STORM DAMAGE REDUCTION WITH RECREATION BENEFITS

SEGMENT II

INTRODUCTION

C-1. The purpose of this appendix is to document the economic justification for Segment II of the Broward County Shore Protection Project. The appendix will identify potential losses that could occur from storms which could cause damages to residential, commercial and retail structures in the effected area along the Atlantic Ocean. It will further describe the derivation of the preliminary National Economic Development (NED) Plan, and, the benefits from the selected alternative plan of improvement based on the expected reduction in damages from storms. The analysis of the NED benefits is based on guidance contained in *ER 1105-2-100, Planning Guidance Notebook*. It is based on economic principles and analysis and reflects the assessment of damages and the benefits to be derived from engineering information provided in making the final conclusions and recommendations.

C-2. Broward County, Florida is located in the southeastern section of the state and is one of the South Florida coastal counties. It is bordered on its north by Palm Beach County, on the west by Collier County, on the south by Dade County and on the east by the Atlantic Ocean. It is about 30 miles south of the Lake Worth Inlet and about 60 miles west of Bimini, The Bahamas. The 24 mile coastline of Broward County consists of three coastal barrier islands west separated from the mainland by the Intracoastal Waterway (ICW). Broward County is among the largest counties in the state and occupies a land area of 1211 square miles. The largest city in the county is Ft. Lauderdale.

PREVIOUS STUDIES

C-3. The 1981 GDM states that the NED plan for Segment II is to extend the 1979 MHW 140 to 170 feet, depending on the section of beach (USACE, 1981). The annualized storm damage prevention and recreational benefits were calculated to be $2,247,000. The benefit to cost ratio was 1.5. The 1983 project extended the Federal project for Segment II from R32-R48+600 to R25-R53. In 1994, the Section 934 Reevaluation Report determined the NED plan for the Federal project to be a 175 foot extension of the ECL, which was established by the 1970 MHW in Pompano Beach and the 1983 MHW in Lauderdale-by-the-Sea. The benefit to cost ratio was found to be 5.4 (USACE, 1994).

C-4. The Coast of Florida Study (COFS), divided Segment II into two projects – Pompano Beach/Lauderdale-by-the-Sea and Ft. Lauderdale (USACE, 1996). The economic analysis for Pompano Beach/Lauderdale-by-the-Sea (R25 to R53) calls for a 35 foot extension of the 1988 Berm (+9.0 ft NGVD). The project yields a benefit to cost ratio of 1.6 and provides $1,319,600 of total annualized benefits. A 25 foot extension of the 1993 berm in Ft. Lauderdale (R53 to R74) will provide $2,005,200 of total annualized benefits. The benefit to cost ratio for this portion is 1.2. The COFS indicates that 64.3% of the Pompano Beach/Lauderdale-by-the-Sea project and 55.9% of the Ft. Lauderdale project qualified for Federal cost sharing.

DEFINITION OF THE STUDY AREA

C-5. For this appendix, the study area is divided into two portions that are defined as (1) the Federal project and (2) a modification to the Federal Project (Figure C-1). Reaches 1 (R25-35) and 2 (R36-53), as defined in Appendix A, are combined and will be considered as Pompano Beach/Lauderdale-by-the-Sea (the current Federal project). Ft. Lauderdale will be represented by Reach 3 (R54-74), defined in Appendix A, the proposed modification to the Federal project.

EXISTING PROBLEM IN THE STUDY AREA

C-6. The general problems are the socio-economic losses as well as losses in revenue to the County from potential storm damages to buildings and land along the Atlantic coastline. Erosion and the lowering of the beach profile along with periodic recession of the shoreline has threatened the quality of the coastline, thus, impacting the oceanfront infrastructure. The shoreline recession can potentially undermine the oceanfront structures. In addition, a part of Highway A1A is susceptible to severe damage and closure. If the shoreline recession is allowed to continue, there will be incidental repercussions to tourism and the local economy. This means lower tourism dollars, which in turn affects the tourist industry and all other business entities which depend on tourism for their livelihoods.

METHODOLOGY OF THE STUDY

C-7. This study will (1) reevaluate the existing Federal project in Pompano Beach/Lauderdale-by-the-Sea and (2) determine a preliminary NED plan for Ft. Lauderdale as a modification to the Federal project. To accomplish this, a Risk and Uncertainty Storm Damage Model (RU SDM) is used to determine storm damage and loss of land benefits provided by various shoreline extensions from an Erosion Control Line (ECL) or project baseline. The cost to build and maintain each shoreline extension used in the RU SDM are subtracted from the storm damage benefits to determine annualized net benefits. The preliminary NED plan is the shoreline extension from the project baseline that produces the largest annualized net benefits.

C-8. This appendix will address the following: describe the RU SDM; the input used for the RU SDM to reevaluate the Federal project; the new preliminary NED plan for the Federal project; RU SDM data used in the analysis of the modification to the authorized project (Ft. Lauderdale extension); the resulting preliminary NED plan for Ft. Lauderdale; and summarize the recommended plans.

THE STORM DAMAGE MODEL

C-9. The Institute for Water Resources has developed a Risk and Uncertainty Storm Damage Model (RU SDM Version 0.2) which simulates damages at existing and future years and determines average annual equivalent damages. The District provided a copy of the model to Broward County for use in this study. The model uses shoreline recessions, caused by background erosion and induced by storms, and structural data to compute expected damages to

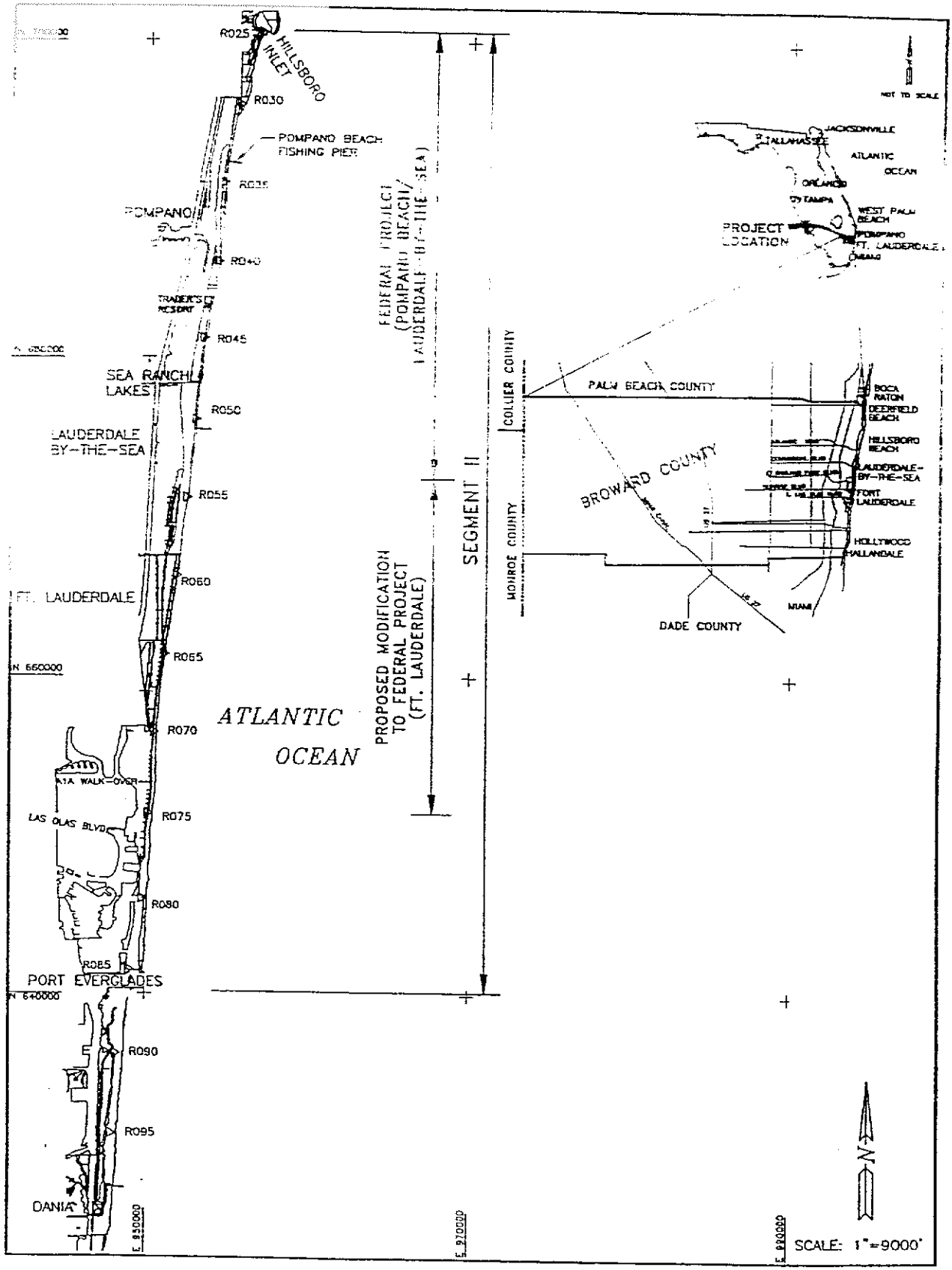


FIGURE C-1

SEGMENT II PROJECT LOCATION MAP

each structure. The model takes into account the risk and uncertainty of the input data to statistically determine the storm damage. For the purposes of analysis, storm damage is defined as the damage incurred by the loss of a given amount of shoreline as a direct result of erosion caused by a storm of a given magnitude and frequency. In addition to residential structures, storm damages were calculated for commercial and public buildings, roads, and associated utilities, seawalls, revetments, bulkheads, and the replacement of lost backfill.

C-10. The RU SDM can be used in a deterministic mode and a statistical mode. In deterministic mode, the model does not account for the risk and uncertainty of the input data. In this mode, the model produces similar results as earlier versions of the SDM. In statistical mode, the model runs a number of iterations (set by the user). The model will output data for each iteration and a running average of all of the iterations. The greater the number of iterations, the smaller the standard error of estimate. For this study, 3000 iterations were used and the standard error of estimate is near an asymptotic value. A seed number of 1701 was used, which allows the statistical results of the model to be reproduced.

C-11. Based upon erosion, storm recession, coastal armor and structure data, annualized equivalent damages for each project condition were calculated. Using this information, a frequency damage relationship was constructed for each year of the project life. The resulting estimates of expected damages were converted to an annual equivalent basis using an interest rate of 6.125 percent for the project life. The RU SDM is used to estimate the damage prevention benefits. First, the model is used to determine annualized equivalent damages for the project area if a project is not implemented and maintained (i.e., without project conditions). A project is defined as a maintained extension of a shoreline. The RU SDM is then used to calculate the annualized equivalent damages for various shoreline extensions (with project conditions). The differences in annualized equivalent damages between the with and without project conditions are the damage prevention benefits.

Storm Damage Model Inputs

C-12. A database for the project area is used to create the input files for the RU SDM. This section will qualitatively address the data that is necessary to create a RU SDM input file. Specific values used to reevaluate the Federal project and to evaluate proposed modifications to the Federal project are presented in subsequent sections. Input files used for this study are attached as Sub-Appendix C-1.

C-13. Existing and Future Shoreline Position. The assessment of damages to the existing development was based on present conditions. Continuous erosion and shoreline recession results in reduced beach width and thus reducing protection between a structure and the expected shoreline position.

C-14. Future year damages were simulated in the model by identifying and locating the shoreline in the future relative to the baseline. Future shorelines can exist in several forms: (1) held constant at one continuous value throughout the project life such as zero feet; (2) allowed to recede over the project life without any interference in the rate of erosion; and (3) allowed to recede at varying distances over the project life, for example, one-foot, three-feet and five feet per year. Without project erosion rates are discussed in Appendix A.

C-15. Storm Frequency-Recession Relationship. The storm frequency-recession relationships are the recession distances that a storm with the given probability (1/Return Period) will yield. Recession is defined as the most landward point that as storm causes a minimum of 0.5 ft vertical erosion. The storm frequency-recession relationship was derived using Empirical Simulation Technique (EST) which is described in Appendix A. SBEACH was used to determine the landward extent of erosion driven by 12 tropical and 13 extratropical storms.

C-16. Coastal Armor Protection. The RU SDM can account for various existing and future types of coastal armor. If coastal armor is present, the model presumes that the armor will halt background erosion indefinitely, but the armor only provides limited protection against storm recession. In the case that upland development is not protected by any armor or the armor fails, it is assumed that armor will be constructed to provide a protection against a potential storm event with a 2 year return period.

C-17. The level of protection provided by each coastal protective structure is based on engineering judgment and is presented in terms of the storm recession that each type of armor would prevent until it is undermined and fails. The replacement costs per linear foot of shoreline are based on engineering cost estimates. The damage factor represents a fraction of the total armor value that will be required to repair or replace the damaged armor. When a concrete sheetpile (CSP) structure is damaged it is considered unrepairable and needs to be completely replaced (i.e., 100% damage factor). Rubble revetment structures were assumed to be repairable if less than 35% of the structure is damaged.

C-18. The locations and types of coastal armor were assessed using aerial photographs, past studies, and design drawings. Field inspections were made to determine the types of coastal armor and it was found that CSP is the type of seawall used (USACE, 1996). Since the 1996 study, no changes have been made to the seawalls.

C-19. Backfill Cost. If a storm broaches coastal armor, the cost to replace the backfill is taken into account. The RU SDM assumes that the backfill is placed to a depth of 3 feet from the existing ground level. The cost of backfill is in terms of dollars per square foot.

C-20. Structure Improvement Values. Structural improvement values were obtained from the Broward County Tax Appraiser's Office and were reviewed by the Jacksonville District Real Estate Division. The value of structural improvements is the replacement value less depreciation. The model limits damages to the structure to the first two stories.

C-21. Parcel Width. The width of the parcel is used to determine the land loss value from background erosion. The RU SDM assumes that the parcel extends landward for an infinite distance.

C-22. Number of Floors. Since the RU SDM limits damages to the first two stories of multiple story structures, the total number of stories is needed. The RU SDM linearly determines the value of the first two stories based upon the total structure value and the total number of floors.

C-23. Physical Dimensions. The model requires the shorefront width of each coastal parcel for several calculations. This information was measured from aerial photographs or past studies. Controlled aerial photographs were used to determine the distance of each structure from the baseline. The following

distances were measured to define the location of development relative to the project baseline for the study area:

a. The distance to existing or future coastal armor,
b. The distance to the seaward edge of buildings, and
c. The distance to the center of the structure, or back of structure if it is a public building or constructed on piles.

C-24. Type of Structure. The RU SDM can apply different land loss values ($/ft^2) to privately owned parcels and public parcels. Furthermore, the parcel's land loss can be discounted. If a parcel is public, but over ¼ mile from an accessible point, the land loss is not counted. The four classifications accepted by the RU SDM are PC, PN, VC, and VN. The first letter indicates if the parcel is public (P) or private (V). The second letter indicates if the land loss value is to be counted (C) or not counted (N).

C-25. Independent Land Value. The RU SDM is able to assign a land value ($/ft^2) other than the private or public land values that are assigned by the RU SDM's parameters. For this study, this option is not exercised.

C-26. Duplicate Lot. Often, there are two or more rows of structures that are impacted by background erosion and/or storm recessions. To prevent erroneous land loss impacts, the parcels that are landward of another parcel are not included in the land loss calculation.

C-27. A second data file that is used contains the risk and uncertainty data. The data files used for this study are presented in Sub-Appendix C-1 and are qualitatively described below.

C-28. Shoreline Position. This is the standard deviation associated with the shoreline position. The RU SDM applies a normal distribution to the shoreline position. Each iteration the model randomly selects a shoreline position within the normal distribution with the given standard deviation.

C-29. Armor and Structure Cost Uncertainty. This parameter is associated with the unit cost of the protective armor and the structure values. The model internally calculates the standard deviation associated with each armor unit cost and each structure value given in the input file.

C-30. Setback Distances. The model applies a normal distribution to the distances from the armor and structure to the baseline. These are the distances described as the Physical Dimensions above. The normal distribution is based upon a standard deviation of the measured distances.

C-31. Backfill Cost. The RU SDM randomizes the unit costs of the backfill with a normal distribution. The mean value is unit cost previously addressed and the standard deviation is assigned in this risk data file.

C-32. Storm Frequency Recessions. The number of storm return periods and associated shoreline recessions is given in the risk data file. This must be the same number the storm recessions determined from EST analysis described in Appendix A and used in the main data file described above. The

standard deviation for each return period is given. The standard deviations were calculated as a part of the EST analysis.

C-33. Coastal Armor Protection. The level of protection provided by the coastal armor is based upon the recession of a storm with a given return period as described above. This variable is randomized using a uniform distribution. The end points of the distribution are assigned in the risk data file. The end point values each type of armor are +-25% of the level of protection given in the main data file. The model randomly selects a value in this range of uniform distribution.

Model Assumptions

C-34. Assumptions used in the development of an estimate of annual storm damages are as follows:

a) the relationship of probability to shoreline recession will remain constant with time,

b) damages to structures will not occur until shoreline recession has exceeded the seaward edge of the structure,

c) when the shoreline recedes halfway through a structure, the structure is considered a total loss as in the case of a single family home,

d) when the shoreline recedes halfway through a structure with more than two stories such as high-rise condominiums, the structure value of only the bottom two floors is considered lost,

e) if a structure is less than one-half undermined, the damage is assumed to be equal to the product of the structure value and the ratio of the horizontal distance eroded through the structure divided by the mid-point of the distance through the structure,

f) all market values of structures are estimated by using the cost approach to value known as Replacement Cost New less Depreciation,

g) content damage is not evaluated,

h) seawalls, revetment and other coastal armor types halt all damage from a given storm until failure. The structure is assumed lost when the volume of scour in front of the structure is sufficient to allow structural failure,

i) although shorefront areas continue to develop through time, damage estimates are limited to existing buildings and structures,

j) repair costs to the coastal armor and the cost of backfill are determined by current engineering estimates of replacement and/or repair cost of such work,

k) after structure failure, the shorefront development, roads, parking lots etc., will be repaired to a condition similar to and in the same location as the without project conditions,

m) the local property owners will protect their own properties to at least a 2-year storm event.

REEVALUATION OF FEDERAL PROJECT

C-35. In this study, the preliminary NED Plan for the Federal project (Pompano Beach/Lauderdale-by-the-Sea) has been reevaluated using the RU SDM described above. This reevaluation is based on the existing project not being in place, all dredged sand is back in the original borrow areas and a project life of 50 years. An interest rate of 6.125% was used. A RU SDM input data file was created to determine the storm damage prevention benefits. The reevaluated preliminary NED Plan width for the Federal project is a 100 foot extension of the ECL/Baseline. The details of this formulation are addressed below. The input data files are shown in Sub-Appendix C-1.

Storm Damage Model Input

C-36. Existing and Future Shoreline Positions. The existing shoreline is taken as the 1970 ECL in Pompano Beach and a project baseline for Lauderdale-by-the-Sea. An ECL was established for Lauderdale-by-the-Sea in 1983, but it is much further seaward than Pompano Beach's ECL, so a project baseline that is equivalent to the Pompano Beach 1970 ECL was used. Details of selecting this baseline are addressed in the project baseline section of Appendix A and consultation with the District was performed.

C-37. Future shoreline positions, relative to the ECL/baseline, are based on the background erosion rate. Based on historic, pre-project erosion rates, the shoreline for Pompano Beach/Lauderdale-by-the-Sea erodes at a rate of 4.0 ft/yr (Appendix A). Based on the 1983-1998 beach profile data, the spatial variability (standard deviation) of the erosion is 3.6 ft/yr. Since the temporal variability is unknown, the temporal variability was assumed equal to the spatial variability.

C-38. Storm Frequency-Recession. Based upon a representative beach profile, SBEACH modeling, and applying an empirical simulation technique (EST), a probabilistic storm recession relationship was developed. Storm recession for storm return periods 1 to 200 years were used in this reevaluation (Table C-1). The high frequency storms have significantly smaller recession values than past reports. Previous studies have used EDUNE to determine the storm recession values, whereas SBEACH was used in this reevaluation (Appendix A).

Table C-1

EST Storm Recessions

Return Period (yrs)	Pompano Beach/LBTS (Federal Project)		Ft. Lauderdale (Modification to Federal Project)	
	Mean Recession (ft)	Standard Deviation (ft)	Mean Recession (ft)	Standard Deviation (ft)

1	18	1	18	3
2	29	2	19	5
5	55	6	31	7
10	73	18	45	37
20	95	23	85	33
50	137	46	122	33
100	162	47	146	31
200	190	61	163	36

C-39. Coastal Armor Protection. Based on engineering judgment, the coastal armor was grouped based upon the level of protection is provides. The armor was, generally, either capped concrete sheet pile (CSP) or rubble revetment. Both of these armor types will protect the landward property and dwellings up to a 5-year storm event, unless the armoring is exceptionally large or small. The small CSP seawalls were determined to provide a level of protection only against a 2-year storm event. The large CSP seawalls provide protection against a 10 year storm event. It is assumed that a 2 year CSP seawall will be constructed when existing armor is destroyed. If armor is not present and the shoreline recedes landward of the property setback distance, a 2 year CSP seawall will be constructed to protect upland structures from damage resulting from storm and shoreline recessions.

Storm Damage Reduction Benefit Analysis

C-40. The RU SDM was used to determine storm damages that would occur if a Federal project were not in place. The annualized damages are $26,001,000 (Table C-2). The RU SDM is then used to determine storm damages that result when a Federal project is in place. A Federal project is defined as a beach width extension to the ECL/baseline that will be maintained throughout the project life. The preliminary NED width at 100 ft. is bracketed by 75 and 125 ft. plan widths.

Table C-2

Annualized Storm Damage Benefits for Pompano Beach/ LBTS Federal Project

Damages – Mean					
Project	Structural	Armor	Backfill	Land Loss	Total
w/o	$19,361,000	$4,680,000	$319,000	$1,614,000	$26,001,000
75 ft	$1,158,000	$189,000	$18,000	$0	$1,365,000

100 ft	$626,000	$107,000	$10,000	$0	$743,000
125 ft	$318,000	$59,000	$6,000	$0	$383,000

Benefits – Mean

Project	Structural	Armor	Backfill	Land Loss	Total
75 ft	$18,203,000	$4,491,000	$301,000	$1,641,000	$24,636,000
100 ft	$18,735,000	$4,573,000	$309,000	$1,641,000	$25,258,000
125 ft	$19,043,000	$4,621,000	$313,000	$1,641,000	$25,618,000

Benefits – 95% Confidence Intervals

Project	Lower Bound	Upper Bound
75 ft	$9,849,000	$37,873,000
100 ft	$9,849,000	$39,440,000
125 ft	$9,849,000	$40,461,000

C-41. Storm damage reduction benefits are the dollar amount of potential storm damage that is prevented by the addition of beach extensions. The storm damage reduction benefits (Development Benefits) are the without project storm damage less the storm damages for the added widths (Table C-2). The storm damage reduction benefits increase as the project width increases. The further the beach is extended, the less damage to upland development will result from storm recession. The upland development damage includes damages and replacement costs to structures, coastal armor, and backfill (the fill landward of coastal armor), which result from probabilistic storm recessions during the project life. Upland structures that are within a 2 year storm recession of the ECL/baseline are condemned once damaged beyond half of the replacement value. For Pompano Beach/LBTS the condemnation distance is 29 feet, which is the 2 year storm recession. It is assumed that a property owner will not replace a structure if it needs rebuilding every 2 years or less.

Loss of Land Benefit

C-42. Another primary benefit of a shore protection project is a reduction in loss of land. Long-term shoreline recession can be determined from beach profile surveys or other historical records. These trends are used to calculate the surface area of land that is expected to be lost over the economic period of analysis. A reduction or halt of long-term shoreline recession which is attributable to a shore protection project provides the basis for calculating an economic benefit.

C-43. Benefits derived from stabilizing the shoreline result from halting the amount of land being lost to long-term shoreline recession. To determine the value of the benefit, the value of the lands being lost must be determined. An economic evaluation of the value of private land losses that occur during each year is used to develop an annual equivalent value. The annual equivalent value is compared for existing without project and with project conditions to determine the magnitude of any shoreline stability benefit. The loss of land benefit for the Federal project area is $1,641,000. This value is added to the storm damage prevention benefit to obtain the total primary benefits for the Federal project (Table C-2).

C-44. The value of the lands used in the analysis was determined according to Engineering Regulation 1165-2-130 which requires that fair market value nearshore land be used in the analysis. Nearshore land is defined in the regulation as "land that is sufficiently removed from shore to lose its significant increment of value because of its proximity to the shore, when compared to adjacent parcels that are more distant from shore."

C-45. The nearshore land value for the Segment II project area was determined using the 1998 Broward County Tax Appraiser data base. The average nearshore land value for the Segment II project area is $25.00 per square foot. This value is consistent with other "nearshore land" values in the southeast region of Florida.

C-46. The evaluation of shoreline stability benefits along public shores (non-Federal) must reflect the special use for which the land is dedicated. Normally, public shores are dedicated for parks or conservation areas. The benefit derived from stabilizing these shores is related to expected losses in recreational activity. Therefore, shoreline stability benefits along public shores must be claimed as incidental benefits. The expected loss of both public and private lands is limited to that portion of shorefront properties lying between the pre-project mean high water line and the existing or future line of coastal armor.

Summary of the Reevaluated Federal Project

C-47. The preliminary NED plan is the added beach width that produces the maximum net benefits and is determined by comparing the storm damage benefits and project costs for various ECL/baseline extensions. To reevaluate the authorized project, project costs and primary benefits were calculated for ECL/baseline extensions of 25 foot increments bracketing the 100 foot beach extension. The optimized renourishment cycles which are 5 years for each width were used in the cost analysis (Appendix A). The project life is 50 years. The interest rate used in this study is 6.125%. The net benefits are determined by subtracting the annualized costs to build and maintain a project from the annualized primary benefits provided by the project. The annual project costs were developed in Appendix A and are shown in Table C-3.

Table C-3

Annualized Pompano Beach Federal Project Benefits and Costs

Added Shoreline Width (ft)	Development Benefits	Land Loss Benefits	Total Primary Benefits	Project Costs	Net Benefits
75	$22,995,000	$1,641,000	$24,636,000	$3,516,000	$21,120,000
100	$23,617,000	$1,641,000	$25,258,000	$3,984,000	$21,274,000
125	$23,977,000	$1,641,000	$25,618,000	$4,530,000	$21,088,000

C-48. The preliminary NED width for Pompano Beach/LBTS (FDEP monuments R26-R53) is a 100 foot ECL/baseline extension (Table C-3). The project extension that yields the maximum net benefit, which is 100 feet, is the preliminary NED plan. For Pompano Beach/LBTS, the maximum annualized net benefit is $21,274,000. The annualized primary benefits are $25,258,000. The annualized cost to build and maintain the preliminary NED plan of 100 feet for 50 years is $3,984,000. As indicated in Appendix A, the preliminary NED plan was not permittable. For Pompano Beach/LBTS, a reduction in the advanced nourishment was necessary to achieve a permittable project. No change in the design width was required. Therefore, the 100 foot extension of the ECL/baseline is the NED plan.

MODIFICATION TO THE FEDERAL PLAN

C-49. A separate preliminary NED plan width was also developed for the northern portion of Ft. Lauderdale (FDEP monuments R53-R74) using the same procedure as was used in Pompano Beach/Lauderdale-by-the-Sea with the exception that the project life was limited to 18 years. RU SDM input data files were created to determine the storm damage prevention benefits. The preliminary NED Plan width for the Ft. Lauderdale modification to the Federal project is a 25 foot extension of the baseline (1998 MHW) and extends from R53 to R74. The NED plan width is a 20 foot extension of the baseline between R-53 and R-71. The details of this formulation are addressed below.

Storm Damage Model Input

C-50. Existing and Future Shoreline Positions. Future shoreline positions, relative to the existing shoreline position (1998 MHW baseline), are based on the background erosion rate. Based on historic, pre-project erosion rates, the shoreline for northern Ft. Lauderdale erodes at a rate of 1.0 ft/yr (Appendix A) with a standard deviation of 1.8 ft/yr.

C-51. Storm Frequency-Recession. Based upon a representative beach profile, SBEACH modeling, and applying an empirical simulation technique (EST), a probabilistic storm recession relationship was developed. Storm recession for storm return periods 1 to 200 years were used in this reevaluation (Table C-1). The high frequency storms have significantly smaller recession values than past reports.

Previous studies have used EDUNE to determine the storm recession values, whereas SBEACH was used in this analysis (Appendix A).

C-52. Coastal Armor Protection. Based on engineering judgment, the coastal armor was grouped based upon the level of protection is provides. The armor was, generally, either capped concrete sheet pile (CSP) or rubble revetment. Both of these armor types will protect the landward property and dwellings up to a 5 year storm event, unless the armoring is exceptionally large or small. The small CSP seawalls were evaluated to provide a level of protection only against a 2-year storm event. The large CSP seawalls provide protection against a 10-year storm event. It is assumed that a 2-year CSP seawall will be constructed when existing armor is destroyed. If armor is not present and the shoreline recedes landward of the property setback distance, a 2-year CSP seawall will be constructed to protect upland dwellings from damage resulting from storm and shoreline recessions.

C-53. Highway A1A travels along the beach for much of Ft. Lauderdale. Between the beach and the roadway, there is a sidewalk and a "seawall." After reviewing highway, sidewalk, and seawall cross sections, it is evident that the "seawall" is not an armoring structure. The short seawall sits on a spread footer; hence the sidewalk and seawall will fail if there is more than 5 ft of storm induced erosion landward of the structure. Because the sidewalk/"seawall" are not privately owned, it is assumed that the sidewalk/"seawall" will be continually replaced, if destroyed.

Storm Damage Reduction Benefit Analysis

C-54. The RU SDM was used to determine storm damages that would occur if the proposed modification to the Federal project is not implemented. This is the without Federal project condition, which is $3,721,000 for the preliminary NED plan (R-53-R-74) and $3,576,000 for the NED plan (R-53-R-71). The RU SDM is then used to determine storm damages that result when a Federal project is in place. A Federal project is defined as an extension to the baseline that will be maintained throughout the project life. Tables C-4a and C-4b shows the storm damages for baseline extensions of 1, 20, 25, and 50 feet.

Table C-4a

Annualized Storm Damage Benefits for Ft. Lauderdale, R-53 to R-74

Damages – Mean					
Project	Structural	Armor	Backfill	Land Loss	Total
w/o	$2,137,000	$429,000	$19,000	$1,136,000	$3,721,000
1 ft	$1,460,000	$241,000	$13,000	$0	$1,714,000
25 ft	$664,000	$127,000	$7,000	$0	$798,000
50 ft	$244,000	$55,000	$3,000	$0	$302,000
Benefits – Mean					
Project	Structural	Armor	Backfill	Land Loss	Total
1 ft	$677,000	$188,000	$6,000	$1,136,000	$2,007,000
25 ft	$1,473,000	$302,000	$12,000	$1,136,000	$2,923,000
50 ft	$1,893,000	$374,000	$16,000	$1,136,000	$3,419,000

Benefits – 95% Confidence Intervals		
Project	Lower Bound	Upper Bound
1 ft	$43,000	$4,064,000
25 ft	$43,000	$6,468,000
50 ft	$43,000	$8,065,000

Table C-4b

Annualized Storm Damage Benefits for Fort Lauderdale, R53 to R71

Damages - Mean					
Project	Structural	Armor	Backfill	Land Loss	Total
w/o	$2,057,000	$370,000	$19,000	$1,130,000	$3,576,000
20 ft	$767,000	$138,000	$8,000	$0	$913,000
Benefits - Mean					
Project	Structural	Armor	Backfill	Land Loss	Total
20 ft	$1,290,000	$232,000	$11,000	$1,130,000	$2,663,000

Benefits - 95% Confidence Intervals		
Project	Lower Bound	Upper Bound
20 ft	$43,000	$5,774,000

C-55. Storm damage reduction benefits are the dollar amount of potential storm damage that is prevented by the addition of beach extensions. The storm damage reduction benefits are the without project storm damage less the storm damages for the added shoreline widths (Table C-4). The storm damage reduction benefits increase as the project width increases. The further the beach is extended, the less damage to upland development will result from storm recession. The upland development damage includes damages and replacement costs to structures, coastal armor, and backfill (the fill landward of coastal armor), during the project life. Upland structures that are within a 2 year storm recession of the baseline are condemned once damaged beyond half of the replacement value. For Ft. Lauderdale, the condemnation distance is 19 feet, which is the 2 year storm recession. It is assumed that a property owner will not replace a structure if it needs to be rebuilt every 2 years or less.

Loss of Land Benefit

C-56. The nearshore land value for Ft. Lauderdale is also $25.00 per square foot. This value was determined for Segment II, which includes Pompano Beach/Lauderdale-by-the-Sea and Ft. Lauderdale. A detailed discussion of loss of land benefit was presented in the previous section (Reevaluation of the Authorized Project).

Project Width and Length

C-57. The preliminary NED plan width was evaluated using the costs (Appendix A) and benefits (Table C-5) based on the project terminating at monument R74. The preliminary NED width was 25 feet. The NED plan width is 20 feet, representing a permittable project ending at monument R-71. The optimal length of the preliminary NED plan was determined by increasing the length of the project in 5,000 foot increments to the inlet. South of R74 the beach is accretional and the upland development is further from the existing shore than north of R74. Therefore, no additional storm damage prevention or loss of land benefits are anticipated. Table C-5 addresses the net benefits for various project lengths. The net benefit is $1,349,000 for the preliminary NED plan and $1,376,000 for the NED plan.

Table C-5
Annualized Ft. Lauderdale Primary Project Benefits and Costs

Added Shoreline Width (ft)	Terminating Monument	Development Benefits	Land Loss Benefits	Total Primary Benefits	Project Costs	Net Benefits
1	R-74	$871,000	$1,136,000	$2,007,000	$1,016,000	$991,000
25	R-74	$1,787,000	$1,136,000	$2,923,000	$1,574,000	$1,349,000
50	R-74	$2,283,000	$1,136,000	$3,419,000	$2,202,000	$1,217,000
25	R-79	$1,787,000	$1,136,000	$2,923,000	$2,037,000	$886,000
25	R-84	$1,787,000	$1,136,000	$2,923,000	$2,231,000	$692,000
20	R-71	$1,533,000	$1,130,000	$2,663,000	$1,287,000	$1,376,000

Summary Of Modifications to the Reevaluated Federal Plan

C-58. The NED plan for Ft. Lauderdale (FDEP monuments R53-R71) was developed extending the baseline to 20 feet. The project costs (Appendix A) and benefits were annualized using an interest rate of 6.125%. The project costs are based on the optimal renourishment interval for each width. The project life for this modification is 18 years, the remaining time of the Federal authorization from the estimated construction year of 2002.

C-59. The NED width for Ft. Lauderdale is a 20 foot extension of the baseline, which is the maximum project extension that is permittable. The NED plan extends from R54 to R71. For Ft. Lauderdale, the maximum annualized net benefit is $1,376,000 (Table C-5). The annualized primary benefits are $2,663,000. The cost to build and maintain this project is $1,287,000 (Appendix A).

COMBINED REEVALUATION AND MODIFICATION OF THE FEDERAL PROJECT

C-60. The total primary benefits of the combined reevaluation and modification to the Federal project were evaluated. The annualized primary benefit of the 100 ft project in Pompano Beach/ LBTS and 20 ft project in Ft. Lauderdale is $25,533,000. The average annual benefit of $25,558,000 for the reevaluated Federal project and $2,663,000 for Ft. Lauderdale were combined as a single project. The base year present worth for the average annual benefits were determined for each project year, then summed together and annualized over 50 years (Table C-6). The average annual benefit for this scenario is $25,533,000 (Table C-6).

INCIDENTAL BENEFIT ANALYSIS

C-61. Recreational benefits are the most common incidental benefit produced by a shore protection project. These benefits result from an increased capacity for a recreational activity with an existing or expected surplus demand (which may be limited by public parking and access). The new beach surface produced by a beach nourishment project increases the capacity for recreational beach activity. All recreational benefits are considered incidental and do not influence optimization of the project design. Procedures for the evaluation of recreational benefits are described in Engineering Regulation 1105-2-100.

C-62. Engineering Regulation 1105-2-100 provides guidance and procedures for the evaluation of recreation benefits. Acceptable evaluation procedures described in this regulation have the following characteristics:

a. The evaluation is based on an empirical estimate of demand applied to the particular project.
b. Estimates of demand reflect the socio-economic characteristics of market area populations, recreation resources under study, and existing alternative recreation opportunities.
c. The evaluation must account for the value of losses or gains to existing sites in the study area and alternative recreation opportunities.

d. Willingness to pay is evaluated by either the travel cost method, contingent valuation method, or day value method.

Annual Beach Activity Demand

C-63. Annual beach activity demand must be determined over the economic life of the project to analyze recreational benefits. This is primarily accomplished by collecting existing beach use data and relating it to current populations. The Florida Department of Environmental Protection performs such studies to determine the recreational needs of residents and tourists. The annual beach activity demand for Segment II is calculated for the existing Federal project area in Pompano Beach/Lauderdale-by-the-Sea (FDEP R25 to R53), and modification to the Federal project area in Ft. Lauderdale (FDEP R53 to R71) (Tables C-7 and C-8).

C-64. Annual per capita participation rates for beach activity in Broward County were obtained from the Reevaluation Report Section 934 Study for Broward County (USACE, 1994). The rates for Broward County residents and out-of-state tourists are 4.567 and 3.092 respectively. The rates for other Florida residents is 0.19. The per capita participation rates are assumed to remain constant throughout the economic period of analysis.

C-65. County and State population data for the Federal project (Pompano Beach/LBTS) area for the years 1970, 1980, and 1990 were obtained from the 1971, 1981, and 1991 "Florida Statistical Abstract." Population projections for the years 2000, 2002, 2010, and 2020 were obtained from the 1998 "Florida Statistical Abstract" (Tables C-7 and C-8). Tourist population projections for the Federal project and the modification to the Federal project were obtained from the Broward County Reevaluation Report Section 934 Study (USACE, 1994) for the years 1990 to 2020. The 1980 tourist population was obtained from the Broward County, Port Everglades to South County Line, G&DDM (USACE, 1979) for Reaches 1 and 2. The 1970 tourist population was linearly extrapolated from the given data.

C-66. The annual beach activity demand for each reach of Broward County is a combination of the demand that is generated by Broward County residents, other State of Florida residents, and tourists. The demand that is generated for Broward County residents, other State of Florida residents, and tourists is determined by multiplying the annual per-capita participation rates by their respective populations. The total beach activity demand for the Federal project and the modification to the Federal project in Broward County is a summation of these components (Tables C-7 and C-8).

C-67. The annual beach activity demand is a percentage of the total beach activity demand for all the public shores in Broward County. In 1995-1996 Broward County's Department of Natural Resource Protection determined the visits to Broward County Beaches by beach segment. The report determined that 53% of the total beach visits occurred in Segment II. This percentage was further refined to determine the percentage of beach visits for the Federal project area and the modification to the Federal project. The Federal project area (Pompano Beach/LBTS) was estimated to have 24.9% of the total Segment II beach visits. The modification to the Federal project (Ft. Lauderdale R-53 to R-71) has 12% of the total visits.

TABLE C-7

BROWARD COUNTY, SEGMENT II
EXPECTED BEACH ANNUAL ACTIVITY DEMAND ANALYSIS
POMPANO BEACH/LBTS (FEDERAL PROJECT)
(ALL NUMBERS IN THOUSANDS)

ITEM	YEAR					
	1970	1980	1990	2000	2010	2020
COUNTY POPULATION (1)	620	1014	1256	1493	1708	1927
TOURIST POPULATION (2)	1674*	3161**	3221	4708	6195	7681
FLORIDA POPULATION (1)	6789	9740	12938	15513	17928	20409
DEMAND: (3)						
COUNTY(VISITS)	2832	4631	5734	6819	7800	8799
TOURISTS(VISITS)	5176	9774	9959	14557	19155	23750
FL. RESIDENTS(VISITS)	1290	1851	2458	2947	3406	3878
TOTAL DEMAND(VISITS)	9298	16255	18151	24323	30361	36426
PROJECT AREA DEMAND (4)	2315	4048	4520	6056	7560	9070

(1) FLORIDA STATISTICAL ABSTRACT (1971, 1981 1991,1998).

(2) TOURIST POPULATION DATA FROM THE BROWARD COUNTY SEGMENT II REEVALUATION REPORT (USACE 1994).
* TOURIST POPULATION DATA LINEARLY EXTRAPOLATED FOR 1970.
** TOURIST POPULATION DATA FROM BROWARD COUNTY G&DDM (USACE 1979).

(3) SALTWATER BEACH PER CAPITA PARTICIPATION RATES FROM REEVALUATION REPORT SECTION 934 STUDY FOR BROWARD COUNTY (USACE 1994).

RESIDENT PER CAPITA RATE	4.567
TOURIST PER CAPITA RATE	3.092
OTHER FLORIDA RESIDENTS RATE	0.19

(4) 24.9 % OF THE TOTAL DEMAND OCCURS BETWEEN R25 AND R53 (BCDNRP 95-96).

TABLE C-8

BROWARD COUNTY, SEGMENT II
EXPECTED BEACH ANNUAL ACTIVITY DEMAND ANALYSIS
FORT LAUDERDALE (MODIFICATION TO FEDERAL PROJECT)
(ALL NUMBERS IN THOUSANDS)

ITEM	YEAR		
	2002	2010	2020
COUNTY POPULATION (1)	1536	1708	1927
TOURIST POPULATION (2)	5005	6195	7681
FLORIDA POPULATION (1)	15996	17928	20409
DEMAND: (3)			
COUNTY(VISITS)	7015	7800	8799
TOURISTS(VISITS)	15477	19155	23750
FL. RESIDENTS(VISITS)	3039	3406	3878
TOTAL DEMAND(VISITS)	25531	30361	36426
PROJECT AREA DEMAND (4)	3064	3643	4371

(1) FLORIDA STATISTICAL ABSTRACT (1998).
(2) TOURIST POPULATION DATA FROM THE BROWARD COUNTY SEGMENT II REEVALUATION REPORT (USACE 1994).
(3) SALTWATER BEACH PER CAPITA PARTICIPATION RATES FROM REEVALUATION REPORT SECTION 934 STUDY FOR BROWARD COUNTY (USACE 1994).

RESIDENT PER CAPITA RATE	4.567
TOURIST PER CAPITA RATE	3.092
OTHER FLORIDA RESIDENTS RATE	0.19

(4) 12.0 % OF THE TOTAL DEMAND OCCURS BETWEEN R53 AND R71 (BCDNRP 95-96).

The remaining 15.9% occur south of the project area. The annual beach activity demand for the project area in each reach is shown in Tables C-7 and C-8.

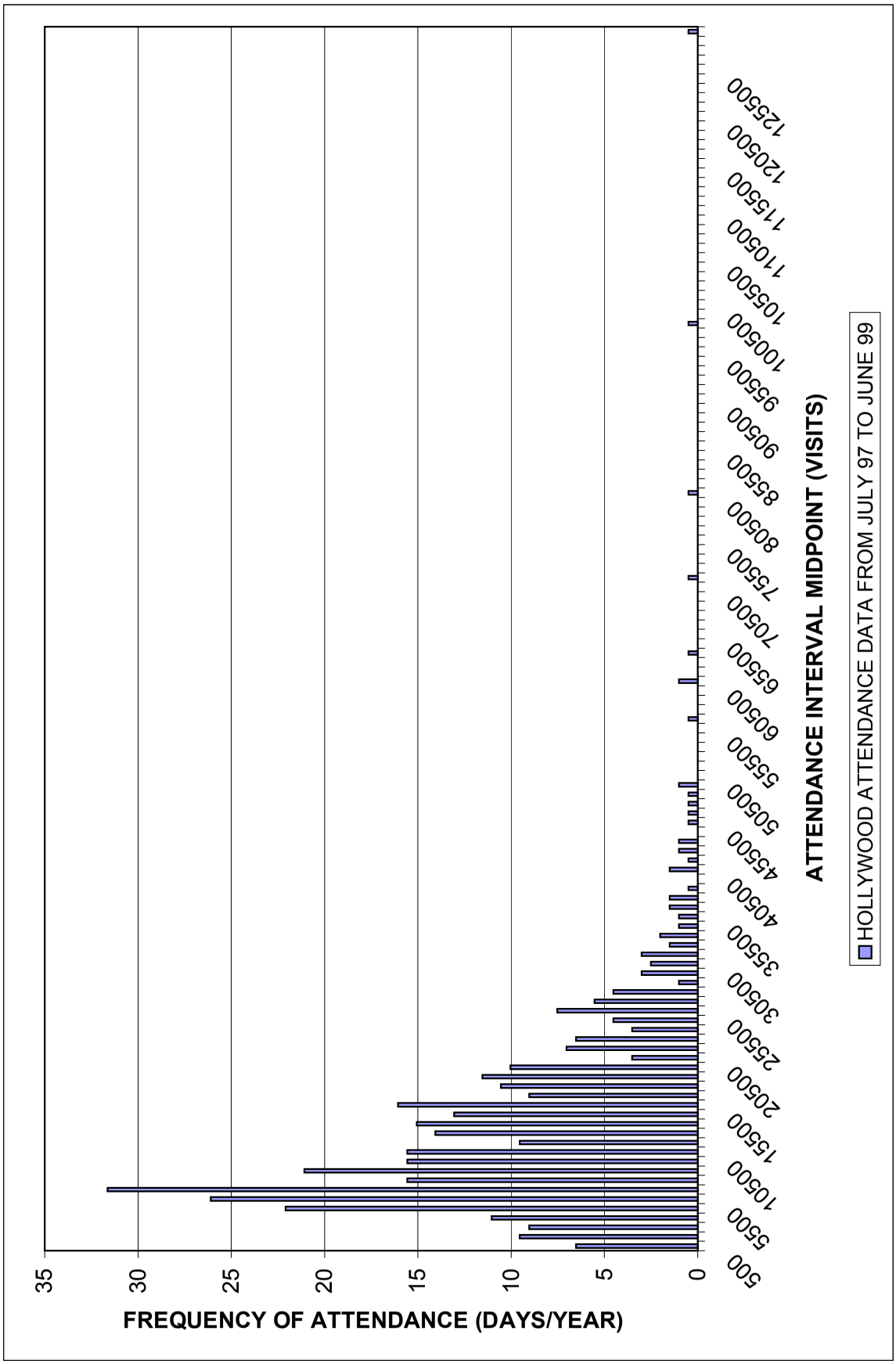
Daily Beach Activity Demand

C-68. Daily beach activity demand varies considerably from day to day with the greatest demand occurring on weekends, holidays, or other special occasions. The variation in daily demand is also dependent on the time of year since tourist demand can be a major component. The distribution pattern of daily beach activity demand is determined by performing a frequency analysis on actual beach activity in the project area whenever possible. Once this pattern is determined, annual beach activity demand can be distributed confidently into daily demand.

C-69. A frequency analysis was performed to determine the distribution of daily beach activity demand. A daily log of observed beach activity was obtained from the City of Hollywood's Fire and Rescue Beach Safety Division for the City of Hollywood public beach. Since approximately 20% of the visits to Broward County beaches occurs at the City of Hollywood Beach (BCDNRP 1996), it is assumed that the resulting frequency analysis is a good indicator for the frequency of beach attendance at all of the Broward County public beaches. Therefore, this analysis can be used to determine the demand distribution for the Federal project and the modification to the Federal project in Segment II. The log consisted of daily (once a day) beach counts for the City of Hollywood Beach from July 1997 to June 1999. Based on the high beach attendance volume from the daily reports, an interval of 1000 visits was chosen for the analysis. The frequency distribution of daily beach activity is shown in Figure C-2.

C-70. Daily beach activity capacity is a measure of the maximum number of people that can recreate on a beach in a single day. Beach capacity is primarily based on the amount of dry beach that is available to the recreational beach visitor. Limitations on beach capacity are imposed by public access and parking. Also, visitors that are walk-ons, cyclists, drop-offs or from buses were considered. Daily beach activity capacity for the Federal project and the modification to the Federal project are shown in Tables C-9 and C-10 for without project conditions. Tables C-11 and C-12 show the daily beach activity capacity for both sections with NED plan widths of 100 feet for Pompano Beach/LBTS and 20 feet for Ft. Lauderdale. It should be noted that the "with project" daily beach capacities will remain constant throughout the life of the project for each shoreline extension. This is based on the assumption that the beach will be renourished prior to the erosion of the design shoreline. Therefore, a long term erosion rate of 0 feet per year is assumed for the with project condition.

C-71. Dry beach surface area is the most important factor in determining daily beach capacity. Dry beach surface area is determined by multiplying the public access lot length by the dry beach width, which is measured between mean high water and the base of the dune or vegetation line, whichever is more seaward. Studies by the U.S. Army Corps of Engineers and the Florida Department of Environmental Protection have determined that approximately 100 square feet of dry beach is required for normal beach activity by the average person. The daily beach capacity, based on the dry beach surface area, is determined by dividing the dry beach surface area by 100 square feet per person and multiplying by a daily turnover rate of 2.



BEACH ACTIVITY DEMAND DISTRIBUTION FIGURE C-2

FOR BROWARD COUNTY

TABLE C-9

BROWARD COUNTY, SEGMENT II
POMPANO BEACH/LBTS (FEDERAL PROJECT)
BEACH CAPACITY WITHOUT PROJECT

DESCRIPTION	PUBLIC PARKING SPACES	NOTIONAL PARKING	PARKING & NOTIONAL CAPACITY (VISITS)	PUBLIC SHORE FRONT (FEET)	1970 BEACH WIDTH (FEET)	1970 DAILY BEACH CAPACITY (VISITS)	1980 BEACH WIDTH (FEET)	1980 DAILY BEACH CAPACITY (VISITS)	1990 BEACH WIDTH (FEET)	1990 DAILY BEACH CAPACITY (VISITS)	2000 BEACH WIDTH (FEET)	2000 DAILY BEACH CAPACITY (VISITS)	2010 BEACH WIDTH (FEET)	2010 DAILY BEACH CAPACITY (VISITS)	2020 BEACH WIDTH (FEET)	2020 DAILY BEACH CAPACITY (VISITS)
ACCESS	0	3	22	20	35	14	0	0	0	0	0	0	0	0	0	0
MARINE DRIVE	65	114	1430	25	40	20	0	0	0	0	0	0	0	0	0	0
NE 16TH ST	35	61	770	50	75	75	35	35	0	0	0	0	0	0	0	0
NE 13TH ST.	4	7	88	50	30	30	0	0	0	0	0	0	0	0	0	0
NE 10TH ST.	0	3	22	35	100	22	60	22	20	14	0	0	0	0	0	0
ACCESS	0	3	22	10	45	9	5	1	0	0	0	0	0	0	0	0
ACCESS	0	3	22	15	25	8	0	0	0	0	0	0	0	0	0	0
POMPANO CITY BEACH	323	565	7106	1590	45	1431	5	159	0	0	0	0	0	0	0	0
NE 2ND ST	15	26	330	50	73	73	33	33	0	0	0	0	0	0	0	0
CITY OF POMPANO BEACH	283	495	6226	508	130	1320	90	914	50	508	10	102	0	0	0	0
CITY OF POMPANO BEACH	282	494	6204	526	60	631	20	210	0	0	0	0	0	0	0	0
ATLANTIC BLVD.	19	33	418	75	10	15	0	0	0	0	0	0	0	0	0	0
SE 2ND ST	24	42	528	40	50	40	10	8	0	0	0	0	0	0	0	0
SE 4TH ST	7	12	154	40	30	24	0	0	0	0	0	0	0	0	0	0
SE 6TH ST	4	7	88	50	90	88	50	50	10	10	0	0	0	0	0	0
SE 8TH ST	6	11	132	50	85	85	45	45	5	5	0	0	0	0	0	0
SE 12TH ST	4	7	88	50	50	50	10	10	0	0	0	0	0	0	0	0
CITY OF POMPANO BEACH	0	3	22	10	0	0	0	0	0	0	0	0	0	0	0	0
ACCESS	0	3	22	20	40	16	0	0	0	0	0	0	0	0	0	0
ACCESS	0	3	22	20	50	20	10	4	0	0	0	0	0	0	0	0
TERRA MARE DRIVE	0	3	22	100	50	22	10	20	0	0	0	0	0	0	0	0
ACCESS	0	3	22	20	35	14	0	0	0	0	0	0	0	0	0	0
ACCESS	0	3	22	20	35	14	0	0	0	0	0	0	0	0	0	0
PINE AVE	0	3	22	25	0	0	0	0	0	0	0	0	0	0	0	0
WASHINGTON AVE.	22	39	484	55	5	6	0	0	0	0	0	0	0	0	0	0
EL PRADO	145	254	3190	50	10	10	0	0	0	0	0	0	0	0	0	0
ACCESS	0	3	22	50	10	10	0	0	0	0	0	0	0	0	0	0
COMMERCIAL BLVD.	382	669	8404	50	10	10	0	0	0	0	0	0	0	0	0	0
DATURA AVE.	29	51	638	50	30	30	0	0	0	0	0	0	0	0	0	0
HIBISCUS AVE.	21	37	462	50	25	25	0	0	0	0	0	0	0	0	0	0
PALM AVE.	5	9	110	50	15	15	0	0	0	0	0	0	0	0	0	0
TOTAL			37114			4125		1511		537		102		0		0

LONGTERM EROSION RATE = -4 FT/YR

TABLE C-10

BROWARD COUNTY, SEGMENT II
FT. LAUDERDALE (MODIFICATION TO THE FEDERAL PROJECT)
BEACH CAPACITY WITHOUT PROJECT

DESCRIPTION	PUBLIC PARKING SPACES	NOTIONAL PARKING	PARKING & NOTIONAL CAPACITY (VISITS)	PUBLIC SHORE FRONT (FEET)	2002* BEACH WIDTH (FEET)	2002 DAILY BEACH CAPACITY (VISITS)	2010 BEACH WIDTH (FEET)	2010 DAILY BEACH CAPACITY (VISITS)	2020 BEACH WIDTH (FEET)	2020 DAILY BEACH CAPACITY (VISITS)
FLAMINGO RD.	0	3	22	30	91	22	83	22	73	22
OAKLAND PARK BLVD.	0	3	22	40	66	22	58	22	48	22
NE 30TH ST.	0	3	22	50	56	22	48	22	38	22
VISTA PARK	15	27	338	150	96	288	88	264	78	234
ACCESS	0	3	22	15	111	22	103	22	93	22
COMMERCE ST (NE 27TH)	21	39	476	100	76	152	68	136	58	116
ACCESS	0	3	22	15	76	22	68	20	58	17
NE 25TH ST	0	3	22	50	66	22	58	22	48	22
NE23RD ST	0	3	22	50	81	22	73	22	63	22
NE 22ND ST	0	3	22	50	76	22	68	22	58	22
NE 21ST ST	25	44	550	50	66	66	58	58	48	48
FT. LAUDERDALE BEACH	1075	1881	23648	8330	76	12662	68	11329	58	9663
TOTAL			25188			13344		11961		10232

LONGTERM EROSION RATE = -1 FT/YR

* THE BEACH WIDTH IS DETERMINED BY SUBTRACTING 4 YEARS OF THE EROSION RATE FROM THE 1998 EXISTING SHORELINE.

TABLE C-11

BROWARD COUNTY, SEGMENT II
POMPANO BEACH/LBTS (FEDERAL PROJECT)
WITH A 100 FOOT SHORELINE EXTENSION

DESCRIPTION	PUBLIC PARKING SPACES	NOTIONAL PARKING	PARKING & NOTIONAL CAPACITY (VISITS)	PUBLIC SHORE FRONT (FEET)	BEACH* WIDTH (FEET) +100 FT	DAILY BEACH CAPACITY (VISITS)
ACCESS	0	3	22	20	135	22
MARINE DRIVE	65	114	1430	25	140	70
NE 16TH ST	35	61	770	50	175	175
NE 13TH ST.	4	7	88	50	130	88
NE 10TH ST.	0	3	22	35	200	22
ACCESS	0	3	22	10	145	22
ACCESS	0	3	22	15	125	22
POMPANO CITY BEACH	323	565	7106	1590	145	4611
NE 2ND ST	15	26	330	50	173	173
CITY OF POMPANO BEACH	283	495	6226	508	230	2335
CITY OF POMPANO BEACH	282	494	6204	526	160	1682
ATLANTIC BLVD.	19	33	418	75	110	165
SE 2ND ST	24	42	528	40	150	120
SE 4TH ST	7	12	154	40	130	104
SE 6TH ST	4	7	88	50	190	88
SE 8TH ST	6	11	132	50	185	132
SE 12TH ST	4	7	88	50	150	88
CITY OF POMPANO BEACH	0	3	22	10	100	20
ACCESS	0	3	22	20	140	22
ACCESS	0	3	22	20	150	22
TERRA MARE DRIVE	0	3	22	100	150	22
ACCESS	0	3	22	20	135	22
ACCESS	0	3	22	20	135	22
PINE AVE	0	3	22	25	100	22
WASHINGTON AVE.	22	39	484	55	105	116
EL PRADO	145	254	3190	50	110	110
ACCESS	0	3	22	50	110	22
COMMERCIAL BLVD.	382	669	8404	50	110	110
DATURA AVE.	29	51	638	50	130	130
HIBISCUS AVE.	21	37	462	50	125	125
PALM AVE.	5	9	110	50	115	110
TOTAL			37114			10793

LONGTERM EROSION RATE = 0 FT/YR

*THE BEACH WIDTH FOR THE DESIGN CONDITION IS DETERMINED FROM THE 1970 SHORELINE.

TABLE C-12

BROWARD COUNTY, SEGMENT II
FT. LAUDERDALE (MODIFICATION TO THE FEDERAL PROJECT)
WITH A 20 FOOT SHORELINE EXTENSION

DESCRIPTION	PUBLIC PUBLIC PARKING SPACES	NOTIONAL PARKING	PARKING & NOTIONAL CAPACITY (VISITS)	PUBLIC SHORE FRONT (FEET)	BEACH* WIDTH (FEET) +20 FT	DAILY BEACH CAPACITY (VISITS)
FLAMINGO RD.	0	3	22	30	115	22
OAKLAND PARK BLVD.	0	3	22	40	90	22
NE 30TH ST.	0	3	22	50	80	22
VISTA PARK	15	27	338	150	120	338
ACCESS	0	3	22	15	135	22
COMMERCE ST (NE 27TH)	21	39	476	100	100	200
ACCESS	0	3	22	15	100	22
NE 25TH ST	0	3	22	50	90	22
NE23RD ST	0	3	22	50	105	22
NE 22ND ST	0	3	22	50	100	22
NE 21ST ST	25	44	550	50	90	90
FT. LAUDERDALE BEACH	1075	1881	23648	8330	100	16660
		TOTAL	25188			17464

LONGTERM EROSION RATE = 0 FT/YR

*THE BEACH WIDTH FOR THE DESIGN CONDITION IS DETERMINED FROM THE ESTIMATED 2002 SHORELINI

C-72. Controlled aerial photographs were used to determine the amount of dry beach in the project area. The 1970 ECL/baseline was used to determine the beach width for the Federal project. For the modification to the Federal project, the 1998 shoreline was plotted on aerial photographs and the beach width was determined by subtracting three years of the erosion rate from the existing 1998 shoreline in order to estimate the beach width for 2002.

C-73. The daily beach capacity parking limitation was determined by adding the number of public parking spaces at each public access, the corresponding notional parking spaces, and multiplying this value by 8. The value of 8 is based on 4 people per car, with a daily turnover rate of 2.

C-74. The available public parking and beach accesses were determined using the data presented in the 1981 GDM for Segment II of Broward County and the 1987 Broward County Beach Management Plan (USACE, 1981 and CPE, 1987) . This data was verified and updated by analyzing the 1999 aerial photographs of the project area and conducting a field inspection.

C-75. Daily beach activity capacity may be limited by public access, parking, and "notional parking." Notional parking and notional visitors are terms commonly used to describe beach visitors such as walk-ons, cyclists, and drop-offs from either buses or cars that recreate on a beach but do not require actual parking spaces. Using the frequency distribution of daily beach activity presented in Figure C-2, a value can be estimated that represents the additional number of people that visit the beach (notional visits) over the number of people that visit the beach due to parking. The number of visits due to parking is estimated to be 11,900. The average number of visits in excess of the parking visits is 32,700. Dividing 32,700 by 11,900 results in a notional visitation value of 2.75. In order to determine the notional parking for each access, the capacity (visits) due to parking alone is first estimated for each access. Next, each parking capacity is multiplied by the notional visits factor of 2.75. This is the total capacity (visits) for each access. The total capacity is subtracted by the capacity due to parking which yields the capacity due to notional parking. Finally, the notional parking capacity is divided by a factor of eight (four people per car and a turnover rate of two) to yield the notional parking at each access.

Travel Cost Method

C-76. The demand for the project area has been developed such that it reflects the socio-economic characteristics and takes into account other available recreational resources within the project area and nearby recreational resources which may act as "sinks" which lessen the demand for the project. The recreation benefit evaluation procedure must determine a willingness to pay, or assign a value to the recreational usage generated by the proposed project. Engineering Regulation 1105-2-100 allows three acceptable methods for determining the value of a recreation visit: the travel cost method, contingent valuation method, and unit day value method. The travel cost method was used for this study.

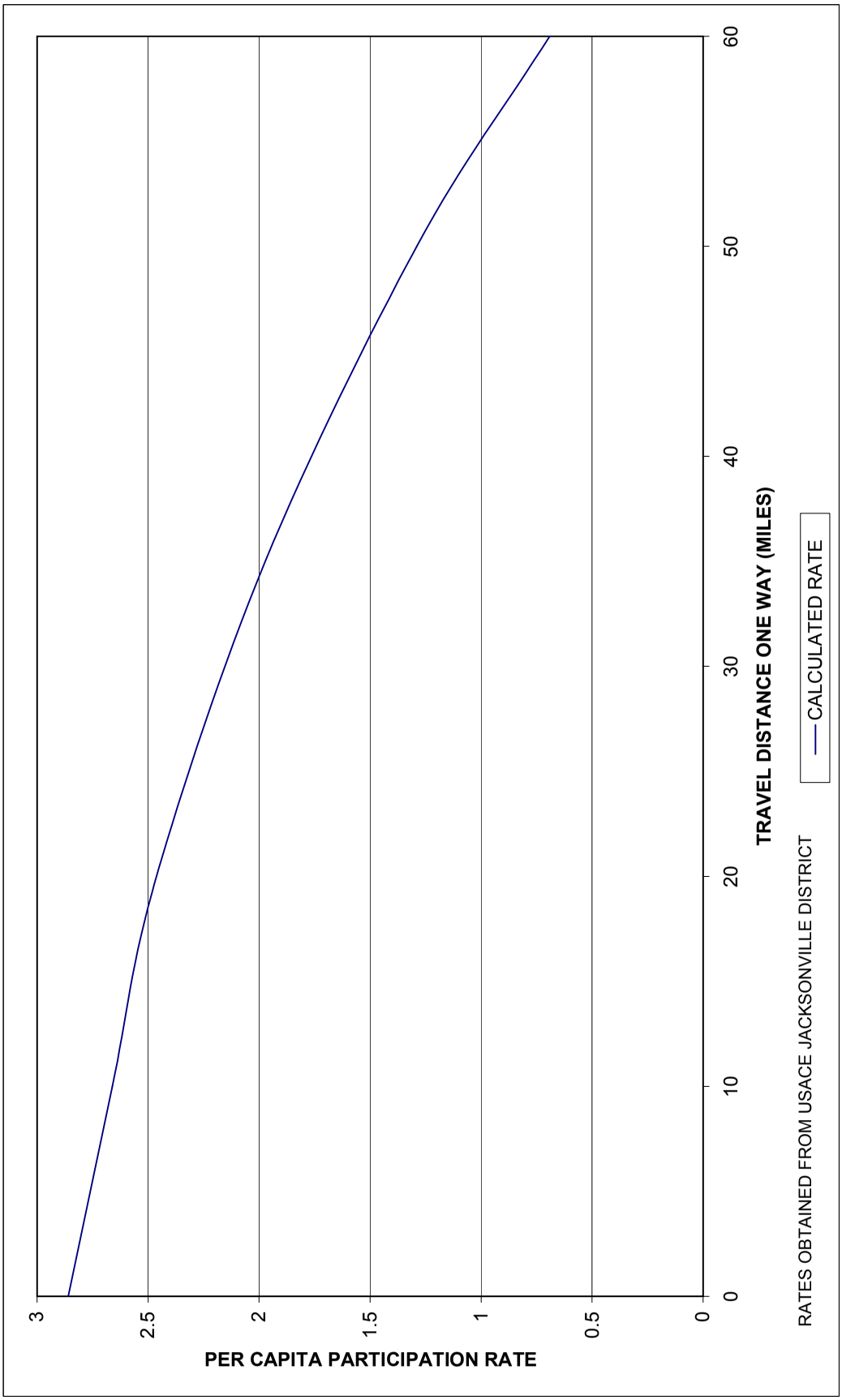
C-77. The basic premise of the travel cost method is that per capita participation to a recreational site decreases as out-of-pocket expenses and travel time to the site increases with other factors remaining constant. The travel cost method consists of deriving a demand curve by using the variable costs of travel and the value of time as proxies for price.

C-78. Estimating Use. The preferred method for estimating use is to relate recreational usage of the proposed site to distance traveled, socio-economic factors, site specific characteristics, and alternative recreation opportunities. The U.S. Army Corps of Engineers Jacksonville District performed a special analysis to determine the per capita participation by zip code for beach activity in Broward County. Using the zip code areas as population zones, a relationship can be developed between recreational beach usage and travel distance for Broward County. The population zones are also used later in the derivation of the resource demand curve.

C-79. The regression analysis used to define the relationship between the per capita participation and travel distance for beach activity was prepared by the U.S. Army Corps of Engineers Jacksonville District. Using this data, a relationship between the per capita participation rate and travel distance is shown in Figure C-3. This functional relationship is assumed to be valid throughout the economic life of the project. The acceptable range of this function is assumed to be from 0 to 60 miles, one way. Participation for distances greater than 60 miles is considered to be zero.

C-80. Deriving Demand. The travel cost method is based on correlating increases in travel distance to the site with increases in the cost of travel or price of recreation for the site. The amount of recreational visits to the project site for different incremental distances is determined by using the per capita participation relationship. This process is used to develop a recreational resource demand curve.

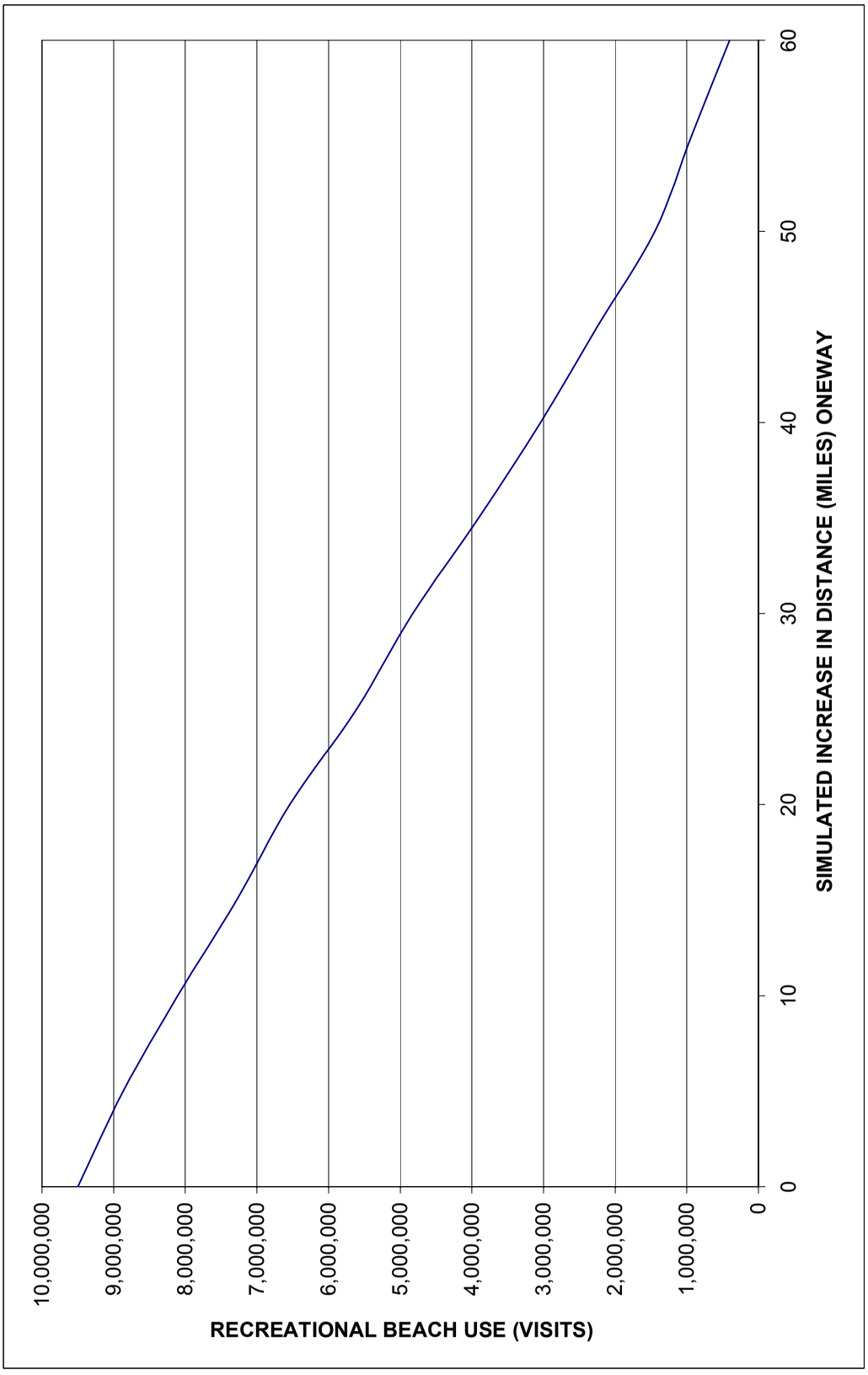
C-81. A resource demand relationship plot was constructed using the population zone data provided by the USACE. The distribution of the population between the zones is shown in Table C-13. The data for zones 3 and 4 were averaged in order to maintain a consistent decreasing participation rate between each consecutive zone. Based on the current distribution of population, recreational demand for the beach was determined by multiplying the population in each zone by the participation rate. This yields the quantity of recreational use, or visits, that would be demanded at a zero price and is the initial point on the resource demand plot. To define the remainder of the plot, other points are generated by making small incremental increases in travel distance and the associated increases in price of participation. This process is essentially equivalent to moving the project farther and farther from the potential users, requiring them to pay more and more in travel costs. As the simulated distance increases, use decreases for each increment in distance, and a new use estimate is computed using the per capita participation curve. For this study, 5 mile increments were used to define the points on the resource demand relationship as shown in Figure C-4.



BROWARD COUNTY, SEGMENT II

FIGURE C-3

PER CAPITA PARTICIPATION RATE VS. DISTANCE



BROWARD COUNTY, SEGMENT II FIGURE C-4

RESOURCE DEMAND RELATIONSHIP

Table C-13
Per Capita Participation Data

Zone	Population	One-Way Mile to Beach	Participation Rate	Total Demand (Visits)
1	1,606,011	10	2.66	4,273,661
2	1,286,462	20	2.46	3,167,090
Avg. 3 and 4 [(1)]	526,497	35	1.97	1,038,313
5	667,348	50	1.29	860,879
6	233,402	60	0.69	161,281
Total Demand				9,501,233

Note: Data provided by USACE Jacksonville District.

[(1)] Zones 3 and 4 were averaged in order to maintain a consistent decreasing participation rate between each zone.

C-82. Cost of Travel. The price associated with various quantities of use is determined by calculating the cost of travel associated with the incremental increases in distance. These are the costs that would be incurred by the recreation users if they were required to travel the additional mileage. The out-of-pocket travel costs are the price that potential users would be most aware of when making a decision about whether to visit a particular recreation area.

C-83. The cost of travel consists of out-of-pocket travel costs and the opportunity cost of time. Out-of-pocket travel costs are determined as an average variable cost per mile. Based on data published by the U.S. Department of Transportation (USDOT), the variable cost to operate a car in 1984 was computed to be 11.47 cents per mile (USDOT, 1985). No data on the cost of travel has been computed or published by the USDOT since 1985. However, the American Automobile Association (1998) prepares a pamphlet each year on the costs of owning and operating automobiles. Out-of-pocket travel (variable) costs to operate an automobile are summarized in Table C-14. For an average of 4 passengers per vehicle, the total variable cost is 2.68 cents per mile per person.

Table C-14
Cost to Operate An Automobile
(Cents Per Mile)

Vehicle Class	Variable Costs			
	Maintenance	Gasoline and Oil	Tires	Total Variable Cost
Full Size	3.2	7.4	1.4	12.0
Intermediate	3.1	6.3	1.4	10.8
Compact	2.9	5.0	1.3	9.2
Average				10.7

Source: American Automobile Association, 1998

C-84. The opportunity cost of time was determined using the guidance provided by IWR Report 91-R-12 (USACE, 1991). Based on the 1998 U.S. family income of $38,885, the opportunity cost of time is $11.21 per car/per hour. Based on the 1998 Florida Statistical Abstract, the 1997 median family income in Broward County is $31,264. Therefore, the opportunity cost of time is computed as shown below:

$$\frac{\$11.21 \times \$31,264}{\$38,885} = \$9.01$$

For an average of 4 people per car, this results in an opportunity cost of time of $2.25 per hour per visitor.

Cost Per Visit. The cost or value of a beach visit is computed in Table C-15. The incremental distances of the resource demand curve are converted into a cost per individual using a cost per mile factor that reflects both time and out-of-pocket travel costs. The value of the visit is a weighted average of the average demand times the increment in total cost (Table C-15). This value is equal to the average amount users are willing to pay, but do not have to pay, for the opportunity to participate in recreation within the project area. The average cost per visit is $3.91.

Benefit Analysis

C-85. Recreational benefits are realized when the number of beach visits that result from the construction of a shore protection project exceed the number of visits that occur without the project. The difference in visitation is the recreational benefit of the project. The value of the benefit is determined by multiplying the number of visits attributable to the project by the value of each visit. This analysis must be performed for each year or incremental years throughout the economic life of the project. The analysis was conducted for the current Federal project area (Pompano Beach/LBTS) and the modification to the Federal project area (Ft. Lauderdale) in Segment II. For the Federal project area, the economic life is a 50-year life beginning in 1970 (pre-construction conditions), in order to justify continued participation in the project. For the modification to the Federal project area the economic life is an 18-year life beginning in 2002 (time of next scheduled renourishment). The resulting benefits are then annualized to determine an annual equivalent recreational benefit.

C-86. The distribution of daily demand for the project area is used to determine the expected amount of visitation in each year. By applying the frequency distribution that was shown in Figure C-2 to the annual beach activity demand in Tables C-7, C-8, and C-9, the distribution of daily beach activity demand can be determined for the economic life of the project. This information is used along with the beach activity capacity data in Tables C-9 to C-12 to calculate the number of visits that are a direct result of the project.

C-87. The economic analysis of the recreational benefits for the current Federal project area and the modification to the Federal project area was conducted for NED plan widths. The individual analysis for the various beach width extensions in each reach are summarized in Sub-Appendix

TABLE C-15

VALUE OF AVERAGE VISIT TO THE BEACH

ONE WAY TRAVEL DISTANCE (MILES)	TWO WAY TRAVEL DISTANCE (MILES)	PARKING DISTANCE (MILES)	TOTAL TRAVEL DISTANCE (MILES)	TRAVEL TIME (HOURS)	TRAVEL COSTS ($/VISITS)	OPPORTUNITY COST OF TIME ($/VISITS)	TOTAL COST OF TRAVEL ($/VISIT)	BEACH USE DEMAND (VISITS)	AVG. DEMAND TIMES INCREMENTAL COST($)
0	0	1	1	0.00	$0.03	$0.00	0.03	9,501,223	$8,950,856
5	10	1	11	0.31	$0.29	$0.71	1.00	8,866,234	$5,179,717
10	20	1	21	0.47	$0.56	$1.05	1.61	8,106,507	$5,905,524
15	30	1	31	0.69	$0.83	$1.55	2.38	7,282,480	$2,728,801
20	40	1	41	0.75	$1.10	$1.68	2.77	6,542,189	$4,110,760
25	50	1	51	0.93	$1.36	$2.09	3.45	5,609,200	$1,527,129
30	60	1	61	0.94	$1.63	$2.11	3.74	4,826,469	$2,679,787
35	70	1	71	1.09	$1.90	$2.46	4.36	3,907,403	$2,131,953
40	80	1	81	1.25	$2.17	$2.80	4.97	3,040,987	$1,623,185
45	90	1	91	1.40	$2.43	$3.15	5.58	2,249,242	$1,133,745
50	100	1	101	1.55	$2.70	$3.50	6.20	1,445,823	$729,473
55	110	1	111	1.71	$2.97	$3.84	6.81	931,652	$409,048
60	120	1	121	1.86	$3.24	$4.19	7.43	401,503	$0
								TOTAL	$37,109,977
								VALUE OF AVERAGE VISIT	$3.91

UNIT OPPORTUNITY COST OF TIME: $2.25 /HR/VISITOR

UNIT TRAVEL COST: 2.68 CENTS/MILE/VISITOR

C-2. The analysis was performed using an interest rate of 6.125% and an average cost per visit of $3.91. For the NED plans, the recreational benefits are $8,933,000 for the Federal project area (100 foot shoreline extension) and $1,819,000 for the modification to the Federal project area (20 foot shoreline extension). Similar to the primary benefits, the total recreational benefits of the NED projects were combined in Table C-16. The total recreational benefit is $9,121,000.

BENEFIT SUMMARY

C-88. A summary of project benefits is provided in Table C-17. The benefit to cost ratio for the combined reevaluated and modified project is 8.3 to 1.

Table C-16

Combined Reevaluation and Modification of the Federal Project Pompano Beach/LBTS and Ft. Lauderdale Recreational Benefits

Project Year	Pompano Beach/ LBTS		Ft. Lauderdale	
	Recreational Benefit	Present Worth at Base Year	Recreational Benefit	Present Worth at Base Year
1	$3,110,406	$3,110,406		
2	$3,697,085	$3,483,708		
3	$4,283,764	$3,803,559		
4	$4,870,443	$4,074,885		
5	$5,457,123	$4,302,223		
6	$6,043,802	$4,489,745		
7	$6,630,481	$4,641,291		
8	$7,217,160	$4,760,389		
9	$7,803,839	$4,850,279		
10	$8,390,519	$4,913,936		
11	$8,977,198	$4,954,088		
12	$9,162,226	$4,764,379		
13	$9,347,254	$4,580,065		
14	$9,532,283	$4,401,156		
15	$9,717,311	$4,227,643		
16	$9,902,340	$4,059,497		
17	$10,087,368	$3,896,679		
18	$10,272,396	$3,739,132		
19	$10,457,425	$3,586,791		
20	$10,642,453	$3,439,580		
21	$10,827,481	$3,297,413		
22	$11,011,704	$3,159,968		
23	$11,195,926	$3,027,405		
24	$11,380,148	$2,899,618		
25	$11,564,371	$2,776,496		
26	$11,748,593	$2,657,928		
27	$11,932,815	$2,543,798		
28	$12,117,038	$2,433,988		
29	$12,301,260	$2,328,380		
30	$12,485,483	$2,226,855		
31	$12,669,705	$2,129,293		
32	$12,761,627	$2,020,958		
33	$12,853,549	$1,918,035	$700,210	$104,487
34	$12,945,470	$1,820,261	$846,453	$119,020
35	$13,037,392	$1,727,384	$992,696	$131,527
36	$13,129,314	$1,639,164	$1,138,939	$142,194
37	$13,221,236	$1,555,374	$1,285,181	$151,191
38	$13,313,158	$1,475,795	$1,431,424	$158,677
39	$13,405,080	$1,400,221	$1,577,667	$164,794
40	$13,497,001	$1,328,455	$1,723,910	$169,677
41	$13,588,923	$1,260,309	$1,870,153	$173,448
42	$13,639,872	$1,192,023	$2,016,802	$176,253
43	$13,690,821	$1,127,421	$2,163,452	$178,157
44	$13,741,769	$1,066,305	$2,310,101	$179,254
45	$13,792,718	$1,008,488	$2,456,751	$179,631
46	$13,843,666	$953,794	$2,603,401	$179,368
47	$13,894,615	$902,053	$2,750,050	$178,536
48	$13,945,564	$853,108	$2,896,700	$177,203
49	$13,996,512	$806,808	$3,043,349	$175,429
50	$14,047,461	$763,010	$3,189,999	$173,270
Total		$138,379,538		$2,912,118
Total Base Year Worth	$141,291,656			
Annualized Total Benefit	**$9,120,939**			
Interest Rate	6.125%			

TABLE C-17

Summary of Benefits

Project	Project Limits	Design Width (feet)	Nourishment Interval (yrs)	Annualized Costs (1)	Primary Benefits	Reference Table	Recreational Benefits (2)	Total Benefits	Net Benefits	Benefit to Cost Ratio
Reevaluation of Federal Project	R26 to R53	100	5	$3,984,000	$25,258,000	C-2	$8,933,000	$34,191,000	##########	8.6
Modification to the Federal Project (NED Ft. Lauderdale Project)	R53 to R71	20	6	$1,287,000	$2,663,000	C-4	$1,819,000	$4,482,000	$3,195,000	3.5
Reevaluated and Modified Federal Project	R26 to R71	100 / 20	5 / 6	$4,155,000	$25,533,000	C-6	$9,121,000	$34,654,000	##########	8.3

(1) Annualized costs can be referred to Table A-29.
(2) Recreation benefits are summarized in paragraph C-87.

REFERENCES

American Automobile Association, "Your Driving Costs," American Automobile Association, Heathrow, FL 1998.

Broward County Department of Natural Resource Protection, "Technical Report 97-03, Broward County Beaches: An Economic Study, 1995-96," pg. 55 Broward County, FL 1996.

Bureau of Economic and Business Research, 1971 Florida Statistical Abstract, The University Presses of Florida, University of Florida, Gainesville, FL 1971.

Bureau of Economic and Business Research, 1981 Florida Statistical Abstract, The University Presses of Florida, University of Florida, Gainesville, FL 1981.

Bureau of Economic and Business Research, 1991 Florida Statistical Abstract, The University Presses of Florida, University of Florida, Gainesville, FL 1991.

Bureau of Economic and Business Research, 1998 Florida Statistical Abstract, The University Presses of Florida, University of Florida, Gainesville, FL 1998.

Coastal Planning & Engineering, Inc., "Broward County Beach Management Plan" submitted to State of Florida Department of Natural Resources, May 1987.

U.S. Army Corps of Engineers, Broward County, Florida Hillsboro Inlet to Port Everglades (Segment II) Shore Protection Project, Reevaluation Report Section 934 Study with Environmental Assessment, U.S. Army Corps of Engineers, Jacksonville, FL April 1994.

U.S. Army Corps of Engineers, "Broward County Beach Erosion Control Project, General & Detail Design Memorandum," U.S. Army Corps of Engineers, Jacksonville, FL 1979.

U.S. Army Corps of Engineers, "Coast of Florida Erosion and Storm Effects Study, Region III, Appendices A thru I," U.S. Army Corps of Engineers, Jacksonville, FL July 1996.

U.S. Army Corps of Engineers, "Phase I General Design Memorandum, Segment II of Broward County, Hillsboro Inlet to Port Everglades Beach Erosion Control and Storm Protection Study Appendices," U.S. Army Corps of Engineers, Jacksonville, FL 1981.

U.S. Army Corps of Engineers Institute for Water Resources, "Value of Time Saved for US in Corps Planning Studies, A Review of the Literature and Recommendations," U.S. Army Corps of Engineers, Ft. Belvoir, VA 1991.

U.S. Bureau of Census, Current Population Reports, P60-206, Money Income in the United States: 1998 U.S. Government Printing Office, Washington, DC 1998.

U.S. Department of Transportation, "Cost of Owning and Operating Automobiles and Vans 1984," Federal Highway Administration, U.S. Department of Transportation, Washington, DC, 1985.

SUB-APPENDIX C-1

RISK & UNCERTAINTY STORM DAMAGE MODEL
INPUT DATA FILE

POMPANO BEACH/LAUDERDALE-BY-THE-SEA

STORM DAMAGE MODEL INPUT DATA FILE

```
'BROWARD [redacted] Low Rise I&S'
1970,50
 0.0
 4.0     8.0    12.0    16.0    20.0
24.0    28.0    32.0    36.0    40.0
44.0    48.0    52.0    56.0    60.0
64.0    68.0    72.0    76.0    80.0
84.0    88.0    92.0    96.0   100.0
104.0  108.0   112.0   116.0   120.0
124.0  128.0   132.0   136.0   140.0
144.0  148.0   152.0   156.0   160.0
164.0  168.0   172.0   176.0   180.0
184.0  188.0   192.0   196.0   200.0
8
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.01,161
.02,137
.05,95
.10,73
.20,55
.50,29
1.0,18
16
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'CSP MEDIUM (AFTER)         ',  750 ,  55    ,  1 ,1.00        2
'CSP-LARGE (AFTER)          ',  850 ,  73    ,  1 ,1.00        3
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'357  484329BG',        9268968,   176, 5,    1, 1,     275, 336, 445,    'VC'      , -1, 0,    'R26',  0
'358  484329AD',        7286256,   395, 14,   1, 1,     275, 317, 375,    'VC'      , -1, 0,    'R27',  0
'359  484329030110'     171252,    50,  1,    1, 1,     65, 285, 320,     'VN'      , -1, 1,    'R27',  0
'360  484329AC',        7216764,   156, 14,   15, 1,    144, 157, 244,    'VC'      , -1, 0,    'R27',  0
'361  484329010060',    0,         100, 1,    15, 1,    115, 125, 130,    'VC'      , -1, 0,    'R27',  0
'362  484329010070',    885396,    100, 3,    1, 1,     126, 415, 472,    'VN'      , -1, 1,    'R27',  0
'363  484329BD',        6259140,   207, 3,    2, 1,     114, 146, 270,    'VC'      , -1, 0,    'R27',  0
'364  484329CC',        6456424,   102, 10,   1, 1,     126, 187, 363,    'VC'      , -1, 0,    'R27',  0
'365  484329BC',        3665928,   117, 7,    1, 1,     90, 106, 136,     'VC'      , -1, 0,    'R27',  0
'366  484329CB',        4948872,   170, 10,   15, 1,    75, 100, 210,     'VC'      , -1, 0,    'R28',  0
'367  484329BJ',        146796,    103, 3,    1, 1,     55, 81, 439,      'VC'      , -1, 0,    'R28',  0
'368  484330ND',        3972636,   204, 4,    1, 1,     134, 210, 278,    'VC'      , -1, 0,    'R28',  0
'369  484330019999'     2789000,   120, 7,    2, 2,     77, 118, 179,     'VC'      , -1, 0,    'R28',  0
'370  484330011400',    1460976,   162, 6,    1, 1,     92, 128, 200,     'VC'      , -1, 0,    'R28',  0
'371  484330011390',    0,         100, 1,    15, 1,    100, 300, 315,    'VC'      , -1, 0,    'R28',  0
'372  484330011160',    1619124,   155, 6,    1, 1,     120, 153, 225,    'VC'      , -1, 0,    'R29',  0
'373  484330AB',        23617680,  415, 16,   2, 2,     121, 148, 275,    'VC'      , -1, 0,    'R29',  0
'374  484330BA',        860856,    50,  2,    1, 1,     117, 140, 184,    'VN'      , -1, 1,    'R29',  0
'375  484331CD',        3663624,   328, 1,    1, 1,     134, 137, 289,    'VC'      , -1, 0,    'R29',  0
'376  484331BH',        779988,    103, 2,    1, 1,     135, 150, 234,    'VC'      , -1, 0,    'R29',  0
'377  484331100110',    198432,    80,  2,    1, 1,     415, 495, 535,    'VN'      , -1, 1,    'R29',  0
'378  484331100150',    72336,     90,  2,    1, 1,     415, 465, 510,    'VN'      , -1, 1,    'R29',  0
'379  484331100270'     371160,    80,  2,    1, 1,     405, 480, 540,    'VN'      , -1, 1,    'R29',  0
'380  484331DK',        6477300,   105, 7,    1, 1,     123, 147, 251,    'VC'      , -1, 0,    'R30',  0
'381  484331100280'     337956,    80,  2,    1, 1,     400, 475, 53,     'VN'      , -1, 1,    'R30',  0
'382  484331BA',        19374948,  375, 19,   1, 1,     119, 149, 234,    'VC'      , -1, 0,    'R30',  0
'383  484331099999'     51000,     102, 2,    1, 1,     118, 134, 217,    'VC'      , -1, 0,    'R30',  0
'384  484331BK',        2507196,   110, 8,    1, 1,     390, 480, 550,    'VN'      , -1, 1,    'R30',  0
'385  484331100110'     230364,    260, 2,    1, 1,     370, 470, 580,    'VN'      , -1, 1,    'R30',  0
'386  484331100090',    76956,     107, 3,    15, 1,    104, 115, 218,    'VC'      , -1, 0,    'R30',  0
'387  484331100100',    51612,     208, 12,   15, 1,    142, 177, 236,    'VC'      , -1, 0,    'R30',  0
'388  484331100120',    61992,     90,  1,    1, 1,     360, 410, 411,    'VN'      , -1, 1,    'R30',  0
'389  484331240020',    0,         90,  1,    1, 1,     350, 415, 416,    'VN'      , -1, 1,    'R30',  0
'391  484331090010',    160368,    54,  2,    1, 1,     151, 155, 224,    'VC'      , -1, 0,    'R30',  0
'393  484331090050',    0,         60,  1,    1, 1,     350, 410, 411,    'VN'      , -1, 1,    'R30',  0
'394  484331090220',    380364,    80,  1,    1, 1,     340, 620, 640,    'VN'      , -1, 1,    'R30',  0
'392  484331090020',    331536,    99,  1,    1, 1,     156, 160, 235,    'VC'      , -1, 0,    'R31',  0
'396  484331090030',    69060,     57,  1,    15, 1,    140, 155, 193,    'VC'      , -1, 0,    'R31',  0
'398  484331090060',    54024,     75,  2,    15, 1,    120, 490, 510,    'VN'      , -1, 1,    'R31',  0
'400  484331GA',        567744,    201, 2,    15, 1,    118, 131, 200,    'VC'      , -1, 0,    'R31',  0
'401  484331401',       3221000,   200, 10,   15, 1,    118, 390, 500,    'VN'      , -1, 1,    'R31',  0
'402  484331DH',        998052,    105, 2,    1, 1,     102, 106, 170,    'VC'      , -1, 0,    'R31',  0
'403  484331116[illegible',  296184,  200, 2,  1, 1,     100, 337, 385,    'VN'      , -1, 1,    'R31',  0
'405  484331100410',    218328,    102, 2,    1, 1,     97, 131, 159,     'VC'      , -1, 0,    'R31',  0
'406  ',                7481000,   150, 2,    1, 1,     245, 310, 450     'VN'      , -1, 1,    'R31',  0
'407  484331H3'         4114416,   202, 5,    2, 2,     79, 104, 145,     'VC'      , -1, 0,    'R31',  0
'408  484331GB'         7328244,   363, 5,    2, 2,     51, 80, 109,      'VC'      , -1, 0,    'R31',  0
'409  484331CG'         46795000,  410, 10,   1, 1,     160, 260, 400,    'VN'      , -1, 1,    'R31',  0
'410  484331080030'     148032,    82,  2,    1, 1,     32, 61, 92,       'VC'      , -1, 0,    'R31',  0
'411  484331080040'     33528,     50,  20,   1, 1,     150, 260, 280,    'VN'      , -1, 0,    'R31',  0
'412  484331080020',    0,         120, 1,    15, 1,    5, 6, 7,          'PC', -1, 0,          'R32',  0
'413  484331080090',    121392,    50,  2,    15, 1,    157, 227, 270,    'VN'      , -1, 1,    'R32',  0
'414  484331080330',    20556,     99,  1,    15, 1,    156, [illegible]9, 361,  'VC'      , -1, 0,    'R32',  0
'415  4331080010',      0,         50,  1     15, 1,    5,                'PC', -1, 0,          'R32',  0
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'416  484331080070',     163224,    97,  2,     15, 1,     153, 233, 284,     'VN'      , -1, 1,     'R32',  0
'417  484331080080',     74400,     97,  1,     15, 1,     154, 347, 366,     'VN'      , -1, 1,     'R32',  0
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'419  484331BC',         36340776,  270,  18,   1, 1,      152, 513, 633,     'VN'      , -1, 1,     'R32',  0
'420  484331AM',         13868520,  270,  15,   1, 1,      160, 236, 342,     'VC'      , -1, 0,     'R33',  0
'421  484331AK',         14732328,  335,  15,   1, 1,      166, 228, 270,     'VC'      , -1, 0,     'R33',  0
'422  484331010190',     200000,    384,  2,    1, 1,      1, 47, 91,         'PN'      , -1, 1,     'R33',  0
'452  484331010210',     788232,    400,  2,    1, 1,      49, 241, 354,      'PC', -1, 0,           'R33',  0
'423  484331010320',     21360,     515,  1,    1, 1,      28, 111, 130,      'VC'      , -1, 0,     'R34',  0
'424  484331010300',     160000,    510,  1,    1, 1,      1, 92, 128,        'VC', -1, 0,           'R34',  0
'425  484331AH',         17427036,  151,  15,   1, 1,      205, 260, 393,     'VN'      , -1, 1,     'R34',  0
'426  484331BB',         32719788,  359,  19,   1, 1,      179, 267, 389,     'VN'      , -1, 1,     'R34',  0
'429  484331010360',     4327080,   252,  9,    1, 1,      205, 291, 318,     'VC'      , -1, 0,     'R34',  0
'431  494306060070',     0,         200,  1,    1, 1,      115, 116, 117,     'PC', -1, 0,           'R35',  0
'432  494306NR',         1912392,   155,  5,    1, 1,      48, 86, 145,       'VC'      , -1, 0,     'R35',  0
'433  494306060090',     0,         368,  3,    1, 1,      55, 96, 123,       'VC'      , -1, 0,     'R35',  0
'434  494306060460',     66000,     75,  1,     1, 1,      215, 270, 295,     'VN'      , -1, 1,     'R35',  0
'435  494306060590',     66000,     75,  1,     1, 1,      215, 310, 320,     'VN'      , -1, 1,     'R35',  0
'436  494306060580',     66000,     75,  1,     1, 1,      215, 330, 345,     'VN'      , -1, 1,     'R35',  0
'437  494306060570',     267312,    120,  1,    1, 1,      215, 270, 450,     'VN'      , -1, 1,     'R35',  0
'438  494306CH',         30738053,  183,  29,   1, 1,      55, 294, 394,      'VC'      , -1, 0,     'R35',  0
'439  494306060120',     0,         100,  1,    15, 15,    50, 51, 52,        'VC'      , -1, 0,     'R35',  0
'440  494306DD',         1204716,   97,  3,     13, 13,    63, 83, 123,       'VC'      , -1, 0,     'R35',  0
'441  494306060150',     174120,    64,  2,     1, 1,      70, 116, 154,      'VC'      , -1, 0,     'R35',  0
'442  494306060160',     91936,     45,  1,     1, 1,      72, 102, 149,      'VC'      , -1, 0,     'R35',  0
'444  494306060450',     441204,    250,  1,    1, 1,      69, 296, 425,      'VN'      , -1, 1,     'R35',  0
'445  494306060390',     38808,     50,  1,     1, 1,      72, 298, 335,      'VN'      , -1, 1,     'R35',  0
'446  494306060170',     218508,    100,  2,    1, 1,      81, 99, 155,       'VC'      , -1, 0,     'R35',  0
'447  494306060180',     0,         60,  1,     1, 1,      90, 91, 92,        'VC'      , -1, 0,     'R35',  0
'448  494306060400',     150408,    75,  1,     1, 1,      145, 307, 380,     'VN'      , -1, 1,     'R35',  0
'449  494306060410',     598572,    100,  2,    1, 1,      183, 318, 374,     'VN'      , -1, 1,     'R35',  0
'700  Cross Rd ',        40000,     40,  1,     1, 1,      120, 121, 321,     'PC', -1, 0,           'R27',  0
'701  Cross Rd ',        40000,     50,  1,     1, 1,      75, 76, 276,       'PC', -1, 0,           'R28',  0
'702  Cross Rd ',        40000,     30,  1,     1, 1,      120, 121, 321,     'PC', -1, 0,           'R29',  0
'703  Cross Rd ',        40000,     40,  1,     1, 1,      180, 230, 430,     'PC', -1, 0,           'R33',  0
'704  Cross Rd ',        40000,     40,  1,     1, 1,      185, 250, 450,     'PN', -1, 1,           'R33',  0
'705  Cross Rd ',        40000,     40,  1,     1, 1,      120, 270, 470,     'PN', -1, 1,           'R35',  0
'706  Cross Rd ',        40000,     20,  1,     15, 1,     40, 270, 470,      'PN', -1, 1,           'R35',  0
'  Road',                135000,    900,  1,    1, 1,      125, 260, 270,     'PN', -1, 1,           'R25',  0
'  Road',                90000,     600,  1,    1, 1,      210, 350, 360,     'PN', -1, 1,           'R26',  0
'  Road',                160000,    800,  1,    1, 1,      100, 250, 270,     'PN', -1, 1,           'R31',  0
'  Road',                200000,    1000,  1,   1, 1,      35, 170, 200,      'PN', -1, 1,           'R31',  0
'  Road',                100000,    500,  1,    15, 1,     150, 165, 190,     'PN', -1, 1,           'R32',  0
'  Road',                200000,    1000,  1,   15, 1,     160, 162, 190,     'PN', -1, 1,           'R33',  0
'  Road',                160000,    800,  1,    15, 1,     195, 197, 220,     'PN', -1, 1,           'R34',  0
'  Road',                260000,    1300,  1,   1, 1,      50, 215, 235,      'PN', -1, 1,           'R35',  0
'1  494306060190',       76896,     67,  2,     1, 1,      90, 144, 228,      'VC'      , -1, 0,     'R36',  0
'2  494306060200',       48060,     51,  2,     1, 1,      90, 147, 176,      'VC'      , -1, 0,     'R36',  0
'3  494306060210',       50556,     43,  1,     1, 1,      90, 115, 165,      'VC'      , -1, 0,     'R36',  0
'4  494306060220',       311544,    59,  1,     1, 1,      90, 106, 142,      'VC'      , -1, 0,     'R36',  0
'5  494306060290',       101832,    94,  1,     1, 1,      90, 106, 178,      'VC'      , -1, 0,     'R36',  0
'6  494306DJ',           1544532,   159,  2,    1, 1,      120, 176, 185,     'VC'      , -1, 0,     'R36',  0
'7  494306DB',           980472,    153,  1,    1, 1,      89, 108, 170,      'VC'      , -1, 0,     'R36',  0
'8  494306030040',       125760,    50,  1,     1, 1,      74, 100, 165,      'VC'      , -1, 0,     'R36',  0
'9  494306CM',           311772,    55,  1,     1, 1,      90, 120, 161,      'VC'      , -1, 0,     'R36',  0
'10  494306030040',      135948,    51,  2,     1, 1,      95, 124, 164,      'VC'      , -1, 0,     'R36',  0
'453  494306AB',         9227532,   200,  7,    1, 1,      185, 302, 420,     'VN'      , -1, 1,     'R36',  0
'455  494306GB',         3534060,   190,  2,    1, 1,      131, 291, 365,     'VN'      , -1, 1,     'R36',  0
'456  494306060320',     50052,     55,  1,     1, 1,      295, 400, 410,     'VN'      , -1, 1,     'R36',  0
'457  494306060330',     83688,     50,  1,     1, 1,      211, 307, 359,     'VN'      , -1, 1,     'R36',  0
'458  494306030300',     200900,    60,  1,     1, 1,      181, 291, 350,     'VN'      , -1, 1,     'R36',  0
'459  494306030220',     526020,    100,  3,    1, 1,      88, 297, 428,      'VN'      , -1, 1,     'R36',  0
'460  494306GM',         1837476,   150,  2,    1, 1,      126, 288, 405,     'VN'      , -1, 1,     'R36',  0
 11  494306030050',      257544,    59,  1      1, 1,      80, 95, 114,       'VC'      , -1, 0,     'R37',  0
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'12  494306010[illegible]',   168240,   53,  1,   1, 1,   78,  96, 141,   'VC'   , -1, 0,   'R37',  0
'13  494306GC',              7313712,  190, 13,   1, 1,   74, 106, 225,   'VC'   , -1, 0,   'R37',  0
'14  494306CD',              26342748, 197, 18,   2, 2,   77, 180, 326,   'VC'   , -1, 0,   'R37',  0
'15  494306DH',              35739672, 180, 18,   2, 2,   75, 100, 300,   'VC'   , -1, 0,   'R37',  0
'16  494306PY',              6691572,  335,  1,   1, 1,   80, 110, 135,   'VC'   , -1, 0,   'R37',  0
'461  4943060301[illegible]', 52800,   50,  1,   1, 1,  107, 289, 340,   'VN'   , -1, 1,   'R37',  0
'463  494306030130',         52884,    50,  1,   1, 1,   74, 274, 382,   'VN'   , -1, 1,   'R37',  0
'464  494306030140',         105660,   50,  1,   1, 1,   76, 292, 312,   'VN'   , -1, 1,   'R37',  0
'17  494306010080',          6148000,  220,  8,   1, 1,   91,  95, 357,   'VC'   , -1, 0,   'R38',  0
'18  494306AA',              2459100,   78,  6,   1, 1,   86, 142, 245,   'VC'   , -1, 0,   'R38',  0
'19  494305000020',          1426944,  156,  8,   1, 1,   88,  94, 160,   'VC'   , -1, 0,   'R38',  0
'20  494305000030',          468240,   153,  1,   1, 1,   75,  87, 217,   'VC'   , -1, 0,   'R38',  0
'21  494306GA',              14176956, 181, 11,  15, 1,   72,  89, 250,   'VC'   , -1, 0,   'R38',  0
'22  494305AB',              34490904, 300, 20,   2, 2,   45,  60, 175,   'VC'   , -1, 0,   'R39',  0
'23  4943050800[illegible]',  2157432,  204,  3,   1, 1,   50,  58, 148,   'VC'   , -1, 0,   'R39',  0
'24  494305AC',              30710292, 283, 29,   2, 2,   47,  61, 187,   'VC'   , -1, 0,   'R39',  0
'25  494306000320',          2064384,  251,  4,  13, 13,  51, 163, 185,   'VC'   , -1, 0,   'R40',  0
'26  494306AP',              18294372, 295, 16,   1, 1,   60,  81, 187,   'VC'   , -1, 0,   'R40',  0
'27  494306PT',              2070348,  160,  2,   1, 1,   54,  79, 234,   'VC'   , -1, 0,   'R40',  0
'28  494306PO',              1614336,  151,  3,   1, 1,   65, 101, 280,   'VC'   , -1, 0,   'R41',  0
'29  494306PV',              1444644,  198,  3,   2, 2,   79, 102, 205,   'VC'   , -1, 0,   'R41',  0
'30  494306PW',              1672380,  207,  3,   2, 2,   68,  87, 260,   'VC'   , -1, 0,   'R41',  0
'31  494306000380',          439656,   105,  2,   1, 1,   49, 107, 259,   'VC'   , -1, 0,   'R41',  0
'32  494306PX',              17955204, 310,  3,   1, 1,   84, 109, 284,   'VC'   , -1, 0,   'R41',  0
'33  494306HD',              26266284, 180, 25,   1, 1,   40,  80, 240,   'VC'   , -1, 0,   'R41',  0
'34  494306000410',          1743564,  199,  3,  13, 13,  39,  77, 184,   'VC'   , -1, 0,   'R42',  0
'35  494306HP',              3249168,  197,  4,   1, 1,   29,  65, 250,   'VC'   , -1, 0,   'R42',  0
'36  494306CA',              2665716,  102,  4,   1, 1,   30,  37, 195,   'VC'   , -1, 0,   'R42',  0
'37  494307AG',              12180908, 185, 16,   1, 1,   42,  74, 240,   'VC'   , -1, 0,   'R42',  0
'38  494307HN',              4304724,  209,  3,   1, 1,   21,  41, 258,   'VC'   , -1, 0,   'R42',  0
'39  4943070056[illegible]',  3216852,  197,  3,   1, 1,   10,  24, 165,   'VC'   , -1, 0,   'R42',  0
'40  494307AK',              22663680, 306, 16,   3, 3,   73,  85, 221,   'VC'   , -1, 0,   'R43',  0
'42  494307AC',              5816268,  157,  5,  15, 1,   13,  79, 300,   'VC'   , -1, 0,   'R43',  0
'43  494307HG',              5149428,  107,  7,  15, 1,   18,  58, 154,   'VC'   , -1, 0,   'R43',  0
'44  494307HK',              37645800, 343, 16,   1, 1,   47,  91, 280,   'VC'   , -1, 0,   'R44',  0
'45  494307HP',              9497352,  204,  9,   1, 1,   10,  28, 263,   'VC'   , -1, 0,   'R44',  0
'46  494307HP',              9497352,  250,  9,   1, 1,   20, 110, 250,   'VC'   , -1, 0,   'R44',  0
'47  4943070001[illegible]',  11283048, 149, 15,  15, 1,   32,  64, 217,   'VC'   , -1, 0,   'R44',  0
'48  494307AU',              21330748, 300, 16,   1, 1,   35, 124, 257,   'VC'   , -1, 0,   'R44',  0
'50  494307000320',          815880,   413,  2,  15, 1,   73, 145, 191,   'VC'   , -1, 0,   'R45',  0
'51  494307AF',              11879604, 192, 15,   1, 1,   60,  83, 247,   'VC'   , -1, 0,   'R45',  0
'52  494307AA',              10781508, 315,  2,  15, 1,   24,  39, 272,   'VC'   , -1, 0,   'R45',  0
'53  494307AB',              11228316, 299,  2,  15, 1,   17,  31, 285,   'VC'   , -1, 0,   'R46',  0
'54  49430710',              3985000,  220,  1,   1, 1,   13,  53, 200,   'VC'   , -1, 0,   'R46',  0
'55  494307AL',              26476692, 252, 15,   1, 1,   48,  71, 350,   'VC'   , -1, 0,   'R46',  0
'56  494307BH',              54887004, 474, 16,   2, 2,   31,  51, 170,   'VC'   , -1, 0,   'R47',  0
'57  494307BJ',              35998140, 318, 15,   2, 2,   30,  59, 180,   'VC'   , -1, 0,   'R47',  0
'58  494307CA',              58604136, 477, 16,   2, 2,   24,  50, 165,   'VC'   , -1, 0,   'R47',  0
'59  49431801061[illegible]', 1000956,  250,  5,   1, 1,   12,  20,  85,   'VC'   , -1, 0,   'R48',  0
'61  4943180105[illegible]',  118476,   51,  2,   1, 1,   16,  40,  86,   'VC'   , -1, 0,   'R48',  0
'62  494318BA',              2163156,  101,  6,   1, 1,   17,  54,  84,   'VC'   , -1, 0,   'R48',  0
'63  4943180105[illegible]',  167628,   99,  2,   1, 1,   17,  25,  79,   'VC'   , -1, 0,   'R48',  0
'64  4943180105[illegible]',  700464,  153,  2,   1, 1,   23,  28,  80,   'VC'   , -1, 0,   'R48',  0
'65  4943180105[illegible]',  143760,   70,  2,   1, 1,   28,  31,  90,   'VC'   , -1, 0,   'R48',  0
'66  4943180105[illegible]',  318756,   85,  3,   1, 1,   19,  21,  87,   'VC'   , -1, 0,   'R48',  0
'67  4943180B',              812028,   52,  2,  15, 1,   11,  30,  80,   'VC'   , -1, 0,   'R48',  0
'68  4943180105[illegible]',  220272,  106,  2,  15, 1,   28,  31,  79,   'VC'   , -1, 0,   'R48',  0
'69  4943180105[illegible]',  486684,   66,  2,   1, 1,   47,  50,  99,   'VC'   , -1, 0,   'R48',  0
'466  49431801061[illegible]', 1000956, 400,  3,   1, 1,   12, 270, 360,   'VN'   , -1, 1,   'R48',  0
'467  494318CM',              952164,   200,  2,   1, 1,   16, 260, 309,   'VN'   , -1, 1,   'R48',  0
'468  4943180106[illegible]',  449808,   200,  2,   1, 1,   16, 360, 400,   'VN'   , -1, 1,   'R48',  0
'469  4943180106[illegible]',  310596,   100,  2,   1, 1,   26, 262, 350,   'VN'   , -1, 1,   'R48',  0
'472  '943180108[illegible]',  139272,   50,  2,   1, 1,   10, [illegible] 300,   'VN'   , -1, 1,   'R48',  0
'473    '3180108[illegible]',  241764,   100,  2,  15, 1,   2, [illegible] 359,   'VN'   , -1, 1,   'R48',  0
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'474  4943180110630',    77292,    50,  2,    1, 1,    10, 320, 400,    'VN'     , -1, 1,    'R48',  0
'475  4943180110620',    61284,    50,  1,    1, 1,    33, 362, 407,    'VN'     , -1, 1,    'R48',  0
'476  4943180110930',    79068,    50,  2,   15, 1,    37, 267, 297,    'VN'     , -1, 1,    'R48',  0
'477  4943180110940',   165432,    50,  2,   15, 1,    35, 360, 400,    'VN'     , -1, 1,    'R48',  0
'478  4943180110920',   238560,   100,  1,   15, 1,    31, 262, 310,    'VN'     , -1, 1,    'R48',  0
'479  494318CK',        301620,    50,  2,   15, 1,    50, 360, 400,    'VN'     , -1, 1,    'R48',  0
'480  4943180110900',   232536,   100,  2,    1, 1,    30, 247, 298,    'VN'     , -1, 1,    'R48',  0
'481  4943180110960',    74328,    50,  2,    1, 1,    30, 360, 400,    'VN'     , -1, 1,    'R48',  0
'482  4943180110970',    92232,    50,  1,    1, 1,    30, 360, 400,    'VN'     , -1, 1,    'R48',  0
'70   4943180110490',   503916,    76,  3,    1, 1,    55, 70, 100,     'VC'     , -1, 0,    'R49',  0
'71   4943180110470',   130944,   103,  1,    1, 1,    56, 84, 114,     'VC'     , -1, 0,    'R49',  0
'72   494319DK',        1580580,  250,  3,    1, 1,    46, 58, 117,     'VC'     , -1, 0,    'R49',  0
'74   4943180119999',   0,        150,  1,    1, 1,    35, 65, 170,     'PC', -1, 0,         'R49',  0
'75   4943180110380',   831156,    49,  4,    1, 1,    42, 79, 126,     'VC'     , -1, 0,    'R49',  0
'76   4943180110370',   867288,    99,  2,    1, 1,    37, 38, 118,     'VC'     , -1, 0,    'R49',  0
'77   4943180110360',   437112,   103,  2,    1, 1,    41, 50, 111,     'VC'     , -1, 0,    'R49',  0
'78   4943180110350',   187080,    53,  2,    1, 1,    43, 51, 118,     'VC'     , -1, 0,    'R49',  0
'483  494318AF',        6070248,  200,  6,    1, 1,    56, 274, 373,    'VN'     , -1, 1,    'R49',  0
'484  4943180110860',   221952,   150,  2,    1, 1,    60, 280, 320,    'VN'     , -1, 1,    'R49',  0
'485  494318DB',        473304,   200,  2,    1, 1,    54, 285, 325,    'VN'     , -1, 1,    'R49',  0
'486  4943180110420',   214740,   100,  2,    1, 1,    55, 370, 400,    'VN'     , -1, 1,    'R49',  0
'487  4943180110840',   983688,   200,  1,   15, 1,    13, 286, 320,    'VN'     , -1, 1,    'R49',  0
'488  4943180111100',   0,        150,  1,    1, 1,    35, 275, 370,    'PN', -1, 1,         'R49',  0
'489  4943180111080',   973704,   100,  2,    1, 1,    35, 305, 380,    'VN'     , -1, 1,    'R49',  0
'490  4943180111130',   242076,   100,  2,    1, 1,    40, 310, 355,    'VN'     , -1, 1,    'R49',  0
'560  4943180110390',   9012,      67,  1,    1, 1,    30, 45, 90,      'VC'     , -1, 0,    'R49',  0
'561  4943180110400',   11100,     67,  1,    1, 1,    30, 45, 90,      'VC'     , -1, 0,    'R49',  0
'562  4943180110410',   2460,      67,  1,    1, 1,    30, 45, 90,      'VC'     , -1, 0,    'R49',  0
'79   4943180110340',   106680,    48,  2,    1, 1,    37, 69, 108,     'VC'     , -1, 0,    'R50',  0
'80   4943180110330',   308676,   103,  2,    1, 1,    18, 50, 128,     'VC'     , -1, 0,    'R50',  0
'81   494318GA',        3935640,   55,  2,    1, 1,    15, 300, 370,    'VC'     , -1, 0,    'R50',  0
'82   4943180110310',   41712,     48,  1,    1, 1,    65, 103, 143,    'VC'     , -1, 0,    'R50',  0
'83   4943180110300',   252504,   100,  2,    1, 1,    16, 75, 129,     'VC'     , -1, 0,    'R50',  0
'84   4943180110290',   253716,   118,  2,    1, 1,    23, 26, 64,      'VC'     , -1, 0,    'R50',  0
'85   4943180110280',   226824,   100,  1,    1, 1,    27, 168, 193,    'VN'     , -1, 1,    'R50',  0
'86   4943180110240',   276600,   100,  2,    1, 1,    -4, 146, 186,    'VN'     , -1, 1,    'R50',  0
'87   4943180110230',   985452,    97,  3,    1, 1,    24, 35, 120,     'VC'     , -1, 0,    'R50',  0
'494  4943180111160',   414336,   100,  1,    1, 1,    10, 320, 350,    'VN'     , -1, 1,    'R50',  0
'496  4943180111190',   167952,   120,  1,    1, 1,    30, 310, 400,    'VN'     , -1, 1,    'R50',  0
'498  4943180111230',   186324,   140,  1,    1, 1,    30, 320, 370,    'VN'     , -1, 1,    'R50',  0
'499  4943180111370',   86124,     50,  1,    1, 1,    25, 310, 360,    'VN'     , -1, 1,    'R50',  0
'501  4943180111380',   226476,    50,  2,    1, 1,    25, 330, 370,    'VN'     , -1, 1,    'R50',  0
'503  4943180111390',   325740,    50,  2,    1, 1,    30, 335, 360,    'VN'     , -1, 1,    'R50',  0
'506  4943180111400',   197796,    50,  2,    1, 1,    25, 330, 370,    'VN'     , -1, 1,    'R50',  0
'542  4913180110270',   133560,   100,  2,    1, 1,    20, 30, 100,     'PC', -1, 0,         'R50',  0
'88   4943180110220',   1192956,  203,  2,   15, 1,    24, 40, 128,     'VC'     , -1, 0,    'R51',  0
'89   4943180110200',   899520,    98,  5,    2, 2,    12, 29, 58,      'VC'     , -1, 0,    'R51',  0
'90   4943180110190',   250452,    56,  2,    2, 2,    60, 92, 126,     'VC'     , -1, 0,    'R51',  0
'91   4943180110180',   202452,    42,  2,    2, 2,    35, 58, 113,     'VC'     , -1, 0,    'R51',  0
'92   494318HP',        1764120,  102,  5,    2, 2,    36, 47, 124,     'VC'     , -1, 0,    'R51',  0
'93   494318DA',        3041880,  156,  2,   15, 1,    35, 35, 109,     'VC'     , -1, 0,    'R51',  0
'95   494318DD',        10493496,  96,  6,   15, 1,    34, 37, 113,     'VC'     , -1, 0,    'R51',  0
'96   494318CH',        4381708,  296,  3,    2, 2,    37, 114, 141,    'VC'     , -1, 0,    'R51',  0
'97   4943180119999',   472000,    52,  1,    2, 2,    22, 33, 89,      'VC'     , -1, 0,    'R51',  0
'508  4943180111410',   179884,   100,  1,   15, 1,    30, 320, 380,    'VN'     , -1, 1,    'R51',  0
'512  4943180111420',   57288,     50,  1,    2, 2,    30, 325, 360,    'VN'     , -1, 1,    'R51',  0
'514  4943180111430',   490632,    50,  1,    2, 2,    25, 320, 360,    'VN'     , -1, 1,    'R51',  0
'516  4943180111440',   99420,     50,  1,    2, 2,    30, 320, 360,    'VN'     , -1, 1,    'R51',  0
'518  4943180111450',   81576,     50,  1,    2, 2,    25, 320, 350,    'VN'     , -1, 1,    'R51',  0
'519  4943180111460',   230004,   100,  1,    2, 2,    30, 315, 360,    'VN'     , -1, 1,    'R51',  0
'523  4943180111560',   196116,    50,  1,   15, 1,    27, 310, 330,    'VN'     , -1, 1,    'R51',  0
'534  4943180111570',   158088,    50,  1,   15, 1,    25, 315, 360,    'VN'     , -1, 1,    'R51',  0
'525  494318AM',        1980768,  150,  1,   15, 1,    25, 300, 350,    'VN'     , -1, 1,    'R51',  0
'527  4943180111600',   933024,   100,  1,    2, 2,    30, 315, 328,    'VN'     , -1, 1,    'R51',  0
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'528  494318011620',     90804,     50,  2,     2, 2,     31, 288, 332,     'VN'      , -1, 1,    'R51',  0
'529  494318011630',     106056,    100,  2,    2, 2,     37, 289, 335,     'VN'      , -1, 1,    'R51',  0
'532  494318011640',     144672,    100,  2,    2, 2,     30, 284, 333,     'VN'      , -1, 1,    'R51',  0
'534  494318011641'      280404,    50,  2,     2, 2,     53, 285, 326,     'VN'      , -1, 1,    'R51',  0
'98  494318010070',      329904,    49,  3,     2, 2,     3, 9, 80,         'VC'      , -1, 0,    'R52',  0
'99  494318010060',      481812,    148,  5,    2, 2,     19, 46, 67,       'VC'      , -1, 0,    'R52',  0
'100  494318010050',     123132,    52,  2,     2, 2,     24, 50, 91,       'VC'      , -1, 0,    'R52',  0
'101  494318010040',     3720,      40,  1,     2, 2,     25, 30, 90,       'VC'      , -1, 0,    'R52',  0
'102  494318010030'      705384,    196,  2,    2, 2,     21, 82, 102,      'VC'      , -1, 0,    'R52',  0
'103  494318010020'      338220,    103,  2,    2, 2,     29, 46, 93,       'VC'      , -1, 0,    'R52',  0
'104  494318NN',         8555052,   201,  17,   1, 1,     52, 94, 210,      'VC'      , -1, 0,    'R52',  0
'537  494318DM',         2131704,   100,  3,    2, 2,     43, 277, 360,     'VN'      , -1, 1,    'R52',  0
'538  494318011750',     84552,     50,  2,     2, 2,     26, 275, 315,     'VN'      , -1, 1,    'R52',  0
'540  494318011710',     289092,    50,  2,     2, 2,     50, 307, 381,     'VN'      , -1, 1,    'R52',  0
'541  494318011650',     4553016,   375,  5,    2, 2,     32, 268, 352,     'VN'      , -1, 1,    'R52',  0
'105  494318AB',         20499324,  339,  17,   1, 1,     15, 30, 140,      'VC'      , -1, 0,    'R53',  0
'707  Cross St.',        40000,     50,  1,     15, 1,    80, 290, 490,     'PC', -1, 0,          'R36',  0
'708  Cross St.',        40000,     30,  1,     15, 1,    90, 250, 450,     'PC', -1, 0,          'R36',  0
'709  Cross St.',        40000,     30,  1,     1, 1,     130, 11, 211,     'PC', -1, 0,          'R37',  0
'710  Cross St.',        40000,     50,  1,     1, 1,     10, 6, 206,       'PC', -1, 0,          'R48',  0
'711  Cross St.',        75000,     100,  1,    15, 1,    5, 36, 236,       'PC', -1, 0,          'R50',  0
'712  Cross St.',        40000,     30,  1,     1, 1,     35, 51, 251,      'PC', -1, 0,          'R51',  0
'713  Cross St.',        40000,     60,  1,     1, 1,     50, 11, 211,      'PC', -1, 0,          'R52',  0
'714  Cross St.',        40000,     40,  1,     15, 1,    10, 310, 510,     'PC', -1, 0,          'R52',  0
'  Road',                230000,    1150,  1,   1, 1,     85, 245, 265,     'PN', -1, 1,          'R36',  0
'  Road',                656250,    1750,  1,   1, 1,     10, 165, 220,     'PN', -1, 1,          'R48',  0
'  Road',                337500,    900,  1,    1, 1,     15, 210, 255,     'PN', -1, 1,          'R49',  0
'  Road',                281250,    750,  1,    1, 1,     25, 225, 265,     'PN', -1, 1,          'R50',  0
'  Road',                243750,    650,  1,    1, 1,     20, 195, 240,     'PN', -1, 1,          'R51',  0
'  Road',                243750,    650,  1,    1, 1,     10, 160, 210,     'PN', -1, 1           'R52',  0
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FORT LAUDERDALE

STORM DAMAGE MODEL INPUT DATA FILES

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'BROWARD COUNTY, Reach 3'
2002,18
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 4.0    5.0    6.0    7.0    8.0    9.0
10.0   11.0   12.0   13.0   14.0   15.0
16.0   17.0   18.0   19.0   20.0   21.0
8
.005,163
.01,145
.02,122
.05,85
.10,45
.20,31
.50,19
1.0,18
16
'CSP-SMALL CAPPED          ', 625 ,  19 ,   1 ,1.00        1
'CSP-MEDIUM CAPPED         ', 750 ,  31 ,   1 ,1.00        2
'CSP-LARGE CAPPED          ', 850 ,  45 ,   1 ,1.00        3
'DUMMY                     ',   0 ,   0 ,   1 ,1.00        4
'DUMMY                     ',   0 ,   0 ,   1 ,1.00        5
'DUMMY                     ',   0 ,   0 ,   1 ,1.00        6
'DUMMY                     ',   0 ,   0 ,   1 ,1.00        7
'DUMMY                     ',   0 ,   0 ,   1 ,1.00        8
'DUMMY                     ',   0 ,   0 ,   1 ,1.00        9
'AIA SIDEWALK              ', 100 ,   5 ,   0 ,1.00       10
'DUMMY                     ',   0 ,   0 ,   0 ,0.00       11
'DUMMY                     ',   0 ,   0 ,   0 ,0.00       12
'RUBBLE - SMALL            ', 200 ,  31 ,   0 ,0.65       13
'DUMMY                     ',   0 ,   0 ,   1 ,1.00       14
'DO NOTHING                ',   0 ,   0 ,   0 ,0.00       15
'DUMMY                     ',   0 ,   0 ,   1 ,1.00       16
1.33
'106  494319AE',        43136508,    435,  21,    2, 2,       83, 110, 259,       'VC'     , -1, 0,    'R53',  0
'107  494319AM',        61764960,    331,  30,    3, 3,       68, 91, 276,        'VC'     , -1, 0,    'R53',  0
'108  494319CA',        22451604,    205,  16,    3, 3,       60, 122, 287,       'VC'     , -1, 0,    'R54',  0
'109  494319080030',    471456,      206,  3,     2, 2,       54, 77, 200,        'VC'     , -1, 0,    'R54',  0
'110  494319AD',        32895804,    186,  18,    3, 3,       54, 80, 247,        'VC'     , -1, 0,    'R54',  0
'111  494319080010',    5906100,     216,  9,     2, 2,       69, 124, 190,       'VC'     , -1, 0,    'R54',  0
'112  494319CH',        3897768,     208,  12,    2, 2,       77, 94, 175,        'VC'     , -1, 0,    'R54',  0
'113  494319BB',        29856228,    195,  19,    3, 3,       97, 165, 294,       'VC'     , -1, 0,    'R55',  0
'114  494319AA',        26688132,    215,  17,    2, 2,       100, 129, 279       'VC'     , -1, 0,    'R55',  0
'115  494319BM',        60196944,    410,  30,    3, 3,       101, 145, 311,      'VC'     , -1, 0,    'R55',  0
'116  494319AK',        23834856,    192,  20,    2, 2,       103, 130, 262,      'VC'     , -1, 0,    'R56',  0
'117  494319CJ',        28485084,    205,  16,    2, 2,       108, 137, 256,      'VC'     , -1, 0,    'R56',  0
'118  494319BA',        26655708,    202,  20,    2, 2,       112, 138, 266,      'VC'     , -1, 0,    'R56',  0
'119  494319CC',        21423756,    200,  10,    2, 2,       108, 136, 251,      'VC'     , -1, 0,    'R56',  0
'120  494319NP',        9869304,     201,  16,    2, 2,       117, 185, 203,      'VC'     , -1, 0,    'R56',  0
'121  494319BC',        24378504,    201,  20,    2, 2,       118, 136, 264,      'VC'     , -1, 0,    'R57',  0
'122  494319BJ',        53759472,    395,  29,    3, 3,       114, 131, 294,      'VC'     , -1, 0,    'R57',  0
'123  494319AB',        23309316,    200,  1,     3, 3,       109, 130, 271,      'VC'     , -1, 0,    'R57',  0
'124  494319BK',        58045452,    393,  23,    3, 3,       106, 125, 393,      'VC'     , -1, 0,    'R57',  0
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'125  494319DC',        107215296,   620,  30,    2, 2,      115, 135, 405,     'VC'     , -1, 0,    'R58',  0
'126  494330012750',    137808,      54,  1,     15, 1,     82, 102, 131,      'VC'     , -1, 0,    'R58',  0
'127  494330012740',    186864,      56,  1,     15, 1,     78, 94, 130,       'VC'     , -1, 0,    'R58',  0
'128  494330012730',    811000,      50,  1,     15, 1,     70, 140, 175,      'VC'     , -1, 0,    'R58',  0
'129  494330012720',    567552,      90,  2,     15, 1,     88, 139, 147,      'VC'     , -1, 0,    'R58',  0
'130  494330012700',    385536,      57,  2,     15, 1,     61, 79, 118,       'VC'     , -1, 0,    'R59',  0
'131  494330012690',    386052,      50,  2,     15, 1,     69, 90, 127,       'VC'     , -1, 0,    'R59',  0
'132  494330012680',    500856,      50,  2,     1, 1,      65, 92, 127,       'VC'     , -1, 0,    'R59',  0
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'307  504201040070',    1555776,    104,  4,    10, 1,     90, 202, 330,     'VN', -1, 1,     'R72',  0
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'311  504201PX',        4457244,    167,  11,   10, 1,     85, 200, 259,     'VN', -1, 1,     'R73',  0
'312  504212100950',    10825000,   280,  12,   10, 1,     70, 175, 300,     'VN', -1, 1,     'R73',  0
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'  A1A Road',           553375,     1165,  1,   10, 1,     85, 86, 136,      'PC', -1, 0,     'R72',  1
'  A1A Road',           415625      875,  1,    10, 1,     75, 76, 126,      'PC', -1, 0      'R73',  1
```

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'730  Cross St.'      40000,      60,  1,      10, 1,      85, 200, 425,      'PN', -1, 1,      'R72',  1
'731  Cross St.',     40000,      40,  1,      10, 1,      90, 180, 405,      'PN', -1, 1,      'R72',  1
'732  Cross St.',     40000,      40,  1,      10, 1,      85, 170, 395,      'PN', -1, 1,      'R72',  1
'733  Cross St.',     40000,      60,  1,      10, 1,      70, 170, 395,      'PN', -1, 1,      'R72',  1
'734  Cross St.',     40000,      60,  1,      10, 1,      75, 170, 395,      'PN', -1, 1,      'R73',  1
'735  Cross St.',     40000,      40,  1,      10, 1,      80, 175, 400,      'PN', -1, 1,      'R73',  1
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SUB-APPENDIX C-2

ANNUAL RECREATION BENEFIT ANALYSIS SUMMARY FOR

SEGMENT II
POMPANO BEACH TO LAUDERDALE-BY-THE-SEA (FEDERAL PROJECT)
FORT LAUDERDALE (MODIFICATION TO FEDERAL PROJECT)

Sub Appendix Table C-2-1

Combined Reevaluation and Modification of the Federal Project Pompano Beach/LBTS

Project Year	Pompano Beach/ LBTS		Ft. Lauderdale	
	Recreational Benefit	Present Worth at Base Year	Recreational Benefit	Present Worth at Base Year
1	$3,110,406	$3,110,406		
2	$3,697,085	$3,483,708		
3	$4,283,764	$3,803,559		
4	$4,870,443	$4,074,885		
5	$5,457,123	$4,302,223		
6	$6,043,802	$4,489,745		
7	$6,630,481	$4,641,291		
8	$7,217,160	$4,760,389		
9	$7,803,839	$4,850,279		
10	$8,390,519	$4,913,936		
11	$8,977,198	$4,954,088		
12	$9,162,226	$4,764,379		
13	$9,347,254	$4,580,065		
14	$9,532,283	$4,401,156		
15	$9,717,311	$4,227,643		
16	$9,902,340	$4,059,497		
17	$10,087,368	$3,896,679		
18	$10,272,396	$3,739,132		
19	$10,457,425	$3,586,791		
20	$10,642,453	$3,439,580		
21	$10,827,481	$3,297,413		
22	$11,011,704	$3,159,968		
23	$11,195,926	$3,027,405		
24	$11,380,148	$2,899,618		
25	$11,564,371	$2,776,496		
26	$11,748,593	$2,657,928		
27	$11,932,815	$2,543,798		
28	$12,117,038	$2,433,988		
29	$12,301,260	$2,328,380		
30	$12,485,483	$2,226,855		
31	$12,669,705	$2,129,293		
32	$12,761,627	$2,020,958		
33	$12,853,549	$1,918,035		
34	$12,945,470	$1,820,261		
35	$13,037,392	$1,727,384		
36	$13,129,314	$1,639,164		
37	$13,221,236	$1,555,374		
38	$13,313,158	$1,475,795		
39	$13,405,080	$1,400,221		
40	$13,497,001	$1,328,455		
41	$13,588,923	$1,260,309		
42	$13,639,872	$1,192,023		
43	$13,690,821	$1,127,421		
44	$13,741,769	$1,066,305		
45	$13,792,718	$1,008,488		
46	$13,843,666	$953,794		
47	$13,894,615	$902,053		
48	$13,945,564	$853,108		
49	$13,996,512	$806,808		
50	$14,047,461	$763,010		
Total		$138,379,538		
Total Base Year Worth	$138,379,538			
Annualized Total Benefit	**$8,932,950**			
Interest Rate	6.125%			

Sub Appendix Table C-2-1 (continued)

Combined Reevaluation and Modification of the Federal Project Pompano Beach/LBTS

YEAR	Number of Visitors due to project	Recreational Benefit
1970	795,500	$3,110,406
1971	945,546	$3,697,085
1972	1,095,592	$4,283,764
1973	1,245,638	$4,870,443
1974	1,395,684	$5,457,123
1975	1,545,729	$6,043,802
1976	1,695,775	$6,630,481
1977	1,845,821	$7,217,160
1978	1,995,867	$7,803,839
1979	2,145,913	$8,390,519
1980	2,295,959	$8,977,198
1981	2,343,280	$9,162,226
1982	2,390,602	$9,347,254
1983	2,437,924	$9,532,283
1984	2,485,246	$9,717,311
1985	2,532,568	$9,902,340
1986	2,579,889	$10,087,368
1987	2,627,211	$10,272,396
1988	2,674,533	$10,457,425
1989	2,721,855	$10,642,453
1990	2,769,177	$10,827,481
1991	2,816,292	$11,011,704
1992	2,863,408	$11,195,926
1993	2,910,524	$11,380,148
1994	2,957,640	$11,564,371
1995	3,004,755	$11,748,593
1996	3,051,871	$11,932,815
1997	3,098,987	$12,117,038
1998	3,146,102	$12,301,260
1999	3,193,218	$12,485,483
2000	3,240,334	$12,669,705
2001	3,263,843	$12,761,627
2002	3,287,353	$12,853,549
2003	3,310,862	$12,945,470
2004	3,334,371	$13,037,392
2005	3,357,881	$13,129,314
2006	3,381,390	$13,221,236
2007	3,404,900	$13,313,158
2008	3,428,409	$13,405,080
2009	3,451,919	$13,497,001
2010	3,475,428	$13,588,923
2011	3,488,458	$13,639,872
2012	3,501,489	$13,690,821
2013	3,514,519	$13,741,769
2014	3,527,549	$13,792,718
2015	3,540,580	$13,843,666
2016	3,553,610	$13,894,615
2017	3,566,640	$13,945,564
2018	3,579,671	$13,996,512
2019	3,592,701	$14,047,46[illegible]
2020	3,605,731	
VALUE PER VISIT		$3.91

Sub Appendix Table C-2-2

Combined Reevaluation and Modification of the Federal Project
Ft. Lauderdale Recreational Benefits

Project Year	Pompano Beach/ LBTS		Ft. Lauderdale	
	Recreational Benefit	Present Worth at Base Year	Recreational Benefit	Present Worth at Base Year
1			$700,210	$700,210
2			$846,453	$797,600
3			$992,696	$881,416
4			$1,138,939	$952,900
5			$1,285,181	$1,013,196
6			$1,431,424	$1,063,359
7			$1,577,667	$1,104,356
8			$1,723,910	$1,137,079
9			$1,870,153	$1,162,346
10			$2,016,802	$1,181,147
11			$2,163,452	$1,193,906
12			$2,310,101	$1,201,258
13			$2,456,751	$1,203,784
14			$2,603,401	$1,202,018
15			$2,750,050	$1,196,445
16			$2,896,700	$1,187,512
17			$3,043,349	$1,175,624
18			$3,189,999	$1,161,153
Total				$19,515,309
Total Base Year Worth	$19,515,309			
Annualized Total Benefit	**$1,819,322**			
Interest Rate	6.125%			

Sub Appendix Table C-2-2 (continued)

Combined Reevaluation and Modification of the Federal Project
Ft. Lauderdale Recreational Benefits

YEAR	Number of Visitors due to project	Recreational Benefit
2002	179,082	$700,210
2003	216,484	$846,453
2004	253,886	$992,696
2005	291,289	$1,138,939
2006	328,691	$1,285,181
2007	366,093	$1,431,424
2008	403,495	$1,577,667
2009	440,898	$1,723,910
2010	478,300	$1,870,153
2011	515,806	$2,016,802
2012	553,312	$2,163,452
2013	590,819	$2,310,101
2014	628,325	$2,456,751
2015	665,831	$2,603,401
2016	703,338	$2,750,050
2017	740,844	$2,896,700
2018	778,350	$3,043,349
2019	815,857	$3,189,999
2020	853,363	
VALUE PER VISIT		$3.91

POMPANO BEACH/LAUDERDALE-BY-THE-SEA

RISK & UNCERTAINTY INPUT DATA FILE

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"Uncertainties Broward COunty Segment II - Pompano Beach/LBTS"
3.6,"Shorelien position sd"
.100,"Armor cost uncertainty at 95% confidence limit"
.100,"structure value cost uncertainty"
1.0,"sd of setback distance"
.22,"sd of backfill cost per ft^3"
8,"# of storm probablilties"
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46
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FORT LAUDERDALE

RISK & UNCERTAINTY INPUT DATA FILE

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"Uncertainties Broward COunty Segment II - Ft Lauderdale"
1.8,"Shorelien position sd"
.100,"Armor cost uncertainty at 95% confidence limit"
.100,"structure value cost uncertainty"
1.0,"sd of setback distance"
.22,"sd of backfill cost per ft^3"
8,"# of storm probablilties"
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33
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APPENDIX D
ECONOMIC ANALYSIS
BROWARD COUNTY, FLORIDA
SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT

SEGMENT III

APPENDIX D
ECONOMIC ANALYSIS
BROWARD COUNTY, FLORIDA
SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT
-- SEGMENT III --

TABLE OF CONTENTS

APPENDIX D
ECONOMIC ANALYSIS
BROWARD COUNTY, FLORIDA
SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT
-- SEGMENT III --

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

D-1. The contents and results included in this appendix are based upon economic principles and analyses that reflect the assessment of damages and project benefits for Segment III of Broward County from engineering information provided to make the final conclusions and recommendations.

Objective

D-2. The objective of this Appendix is to reevaluate the economics of the authorized Segment III beach erosion control project and assess the benefits of required project modifications. Proposed project modifications are formulated based upon engineering and economic benefits to the project performance. Economic benefits associated with the project modifications proposed herein are based upon current storm protection needs and overall project cost minimization.

Study Area

D-3. The study area extends from the south jetty of Port Everglades (approximately FDEP monument R-86) to the Broward-Dade County Line (FDEP monument R-128). The area includes John U. Lloyd Beach State Recreation Area, the city of Dania Beach, the city of Hollywood, and the city of Hallandale Beach. The study area is about 8.1 miles in length and the upland infrastructure includes single-family houses, condominiums, retail businesses, public building, and public recreational areas. The extent of the Segment III project area is shown in Figure D-1.

Problem Identification

D-4. The general problem along the Segment III shoreline is the socio-economic losses in revenue to the County from potential storm damages to upland buildings and infrastructure and the continued loss of land along the Atlantic coastline. The continued erosional stress along the Segment III shoreline has resulted an increased threat to upland development and properties. Past attempts to reduce the storm related damages along the shoreline Segment had been mostly successful with the appropriate renourishment of the shoreline. Areas of the constructed project, however, have not performed as intended due to the unusually high localized erosional stress. These areas include the terminal ends of the beach fill at the northern end of Hollywood and the southern end of John U. Lloyd and the northernmost 2,800 feet of shoreline along the John U. Lloyd Beach State Recreation Area. The latter is located immediately downdrift of the Port Everglades Entrance. Modifications to the authorized project are proposed to address these areas of the project that have not met the original objects of the authorized project.

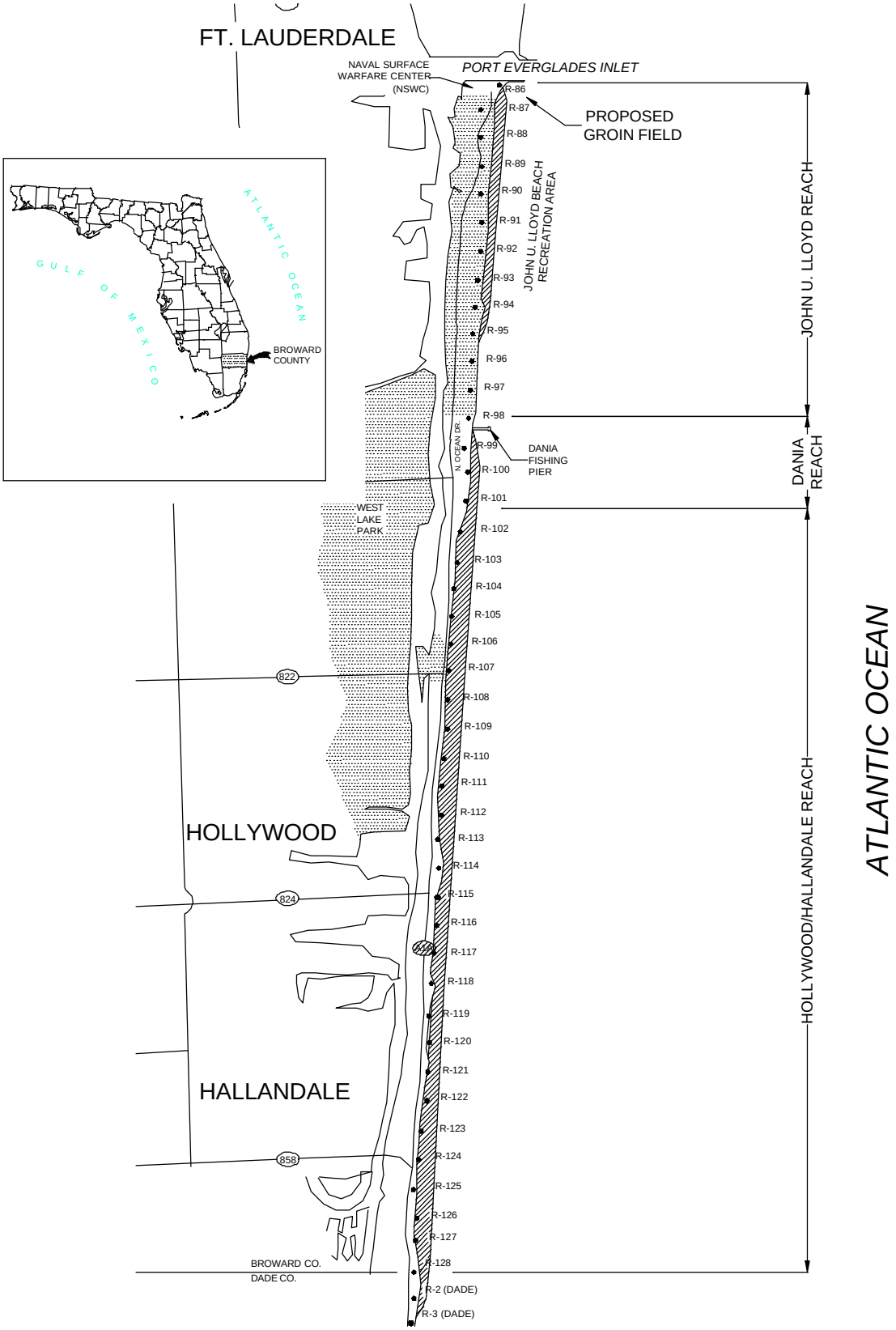

Figure D-1: Location and extent of Segment III reaches.

Description of Authorized Project (1965)

D-5. The Broward County, Florida Shore Protection Project was authorized by Section 301 of Public Law 89-298, passed on 27 October 1965. The project was authorized in accordance with the report of the Chief of Engineers dated 15 June 1964 and is described in House Document 91, 89th Congress. The project was to be constructed in three separable segments. These three segments are: I) the north county line to Hillsboro Inlet, II) Hillsboro Inlet to Port Everglades, and III) Port Everglades Inlet to the south county line. This appendix is concerned with Segment III of the authorized project. Since the Broward County Shore Protection Project was authorized, two reaches of Segment III have been constructed. These are (1) the northern section of the John U. Lloyd State Recreational Area shoreline and (R-86 to R-94) and (2) the Hollywood/Hallandale Beach shoreline (R-101 to R-128).

D-6. The authorization for the Segment III shoreline provided for the restoration of 8.1 miles of shoreline and periodic nourishment for a period of 10 years following initial construction of the project. Following a 1991 Reevaluation Report Section 934 Study, Federal participation in the authorized project was extended to 50 years after initial construction.

Description of Authorized Project (Constructed)

D-7. Northern John U Lloyd (R-86 through R-94) was initially nourished in 1976 with approximately 1.09 million cubic yards of fill. That project extended along 1.52 miles of shoreline between FDEP monuments R-86 and R-94. It is assumed for the purposes of this analysis that the background erosion rate between R-86 and R94 prior to construction was 46,400 cubic yards per year. Berm elevation was constant at +10 feet, MSL. Constructed beach slopes were 1:20 above MLW and 1:30 below MLW. The General Design Addendum (GDA) (1976) for this project indicated a design beach measuring 150 feet wide at the berm.

D-8. Considering the renourishment interval and erosion rate, the design volume placed along the 1.52 miles of shoreline between R-86 and R-94 during initial construction was approximately 768,000 cubic yards. Applying the average beach slopes and berm elevation, it is estimated that the design berm width at that location measured approximately 100 feet at the MHW line.

D-9. The Hollywood and Hallandale Beach project reach was originally constructed in 1979. This project included about 5.25 miles of shoreline between R-101 and R-128. According to the original General and Detail Design Memorandum (G&DDM) (1978) a design beach along Hollywood and Hallandale Beach (R-101 to R-128) was constructed using 1,589,600 cubic yards of sediment producing equilibrated design beach widths from 34.4 to 98.7 feet at the local MHW elevation. Beach slopes constructed along this reach were 1:15 above MLW and 1:45 below MLW. Berm elevations were reportedly +7 feet, NGVD with an intermediate berm placed at +4 feet, NGVD.

D-10. Along the Hollywood/Hallandale Beach reach of Segment III it is estimated that the average equivalent design beach width along the 28,800 feet of shore is about 50-foot at the MHW.

D-11. In summary, it is assumed that the authorized design beach widths for the constructed reaches of Segment III include a 100-foot MHW extension in northern John U. Lloyd combined with a 50-foot MHW extension along Hollywood/Hallandale Beach. Table D-1 includes a summary of the dimensions of the authorized Segment III project reaches.

Table D-1: Summary of authorized project dimensions.

	R-86 to R-94	**R-101 to R-128**
Design Volume (cy)	768,000	1,589,600
Berm Elevation (ft)	+10, MSL	+7 & +4, NGVD
Erosion Rate (cy/yr)	46,400	55,560
Renourishment Interval (yr)	5	5
1976 & 1978 Reported Design Width (ft)	150 - berm	34 to 99 - MHW
1999 Equivalent Design Width (ft)	100 - MHW	50 – MHW

Methodology of the Study

D-12. The study will reevaluate the dimensions and economic benefits of the authorized project. This will include computation of the costs and benefits of various design berm widths using current structure and land values and construction price levels. The reevaluation will consider the entire 50-year project life and the required sand volume necessary to construct and maintain a project along the authorized shoreline reach. Simplistically, this analysis assumes that the project had not been built and that sand resources that have been used in the past are available for the 50-year project. The results of the reevaluation will demonstrate economically optimal project dimensions under current economic conditions. These dimensions will represent the National Economic Development (NED) Plan.

D-13. Economic justification for this project is based on the protection of an estimated $562 million of structural improvements located along the shoreline of the study area. Shorefront development within this segment is a mixture of single and multi-family dwellings, commercial properties and park improvements. The value of shorefront development was determined by the Jacksonville District Real Estate Division from information collected from the Broward County Tax Appraiser's Office. The values reflect current dollars.

D-14. Recreational benefits will also be computed for the Segment III. The recreational benefits will reflect the current cost of beach visit and the existing recreational infrastructure (i.e., parks, parking, beach accesses, etc.) that exists along the Segment III shoreline.

D-15. The cost to implement the reevaluated project over the remainder of the project life will also be developed. Project implementation, however, may require modifications to the authorized plan. Modifications to the reevaluated project are proposed and evaluated based on their ability to improve the physical performance of the project and/or reduce average annual project costs. Modifications investigated include the addition of beach fill tapers at the terminal ends of the authorized project, construction of a design beach section between R-94 and R-101, construction of a groin field in John U. Lloyd, and implementation of sand bypassing at Port Everglades.

REEVALUATION OF AUTHORIZED FEDERAL PROJECT (1976-2026)

D-16. Federal Shore Protection Project benefits are categorized as primary and incidental. Primary benefits are realized through the reduction or prevention of damage to upland development and infrastructure caused by storms. Primary benefits also include those gained through stabilization of the shoreline thereby preventing land loss in the project area. Incidental benefits include the increased recreational capacity attributable to an increase in beach width and shoreline stability accompanying the project. Increased recreational capacity serves to meet an existing and expected surplus demand of beach users on the project shoreline.

D-17. Guidance for the inclusion of incidental project benefits such as recreation are set forth in Engineering Regulation (ER) 1105-2-100. This regulation states “recreation benefits produced as a benefit of the basic project may exceed 50% of the total project benefits, but economic justification must be demonstrated on the basis of recreation benefits limited to 50% of the total project benefits.” That is, despite the allowance for inclusion of incidental benefits, the NED plan must formulated on the basis that average annual equivalent primary benefits must exceed 50% of the average annual project costs. Formulation of the National Economic Development (NED) Plan for Segment III was based on the determination of the plan resulting in the maximization of net primary benefits as defined by the difference between total average annual primary benefits and average annual costs.

PRIMARY BENEFITS

D-18. Primary benefits include storm damage reduction and loss of land benefits. Storm damage benefits accrue from a reduction in storm damage to upland structures as a result of a shore protection project. Storm damage benefits are estimated by computing storm-induced damage to upland structures, infrastructure, and coastal armor for with and without project conditions. The without project condition is defined as the status of the beach prior to the implementation or authorization of any project. The with-project condition, or damage that is prevented, is defined as the authorized project condition.

The reduction in computed storm damage is equivalent to the storm damage benefit provided by the shore protection project.

The Storm Damage Model

D-19. The Risk and Uncertainty Storm Damage Model Version 0.2 (RU SDM) relates changes in shoreline and bluff position, due to annual shoreline and storm-induced beach recession, to the location of upland property and infrastructure. The shoreline position and location of the upland properties are related to one another using a common baseline. The common baseline is defined as the approximate pre-project (1977) mean high water shoreline. In this instance, the established Erosion Control Line (ECL) is assumed to represent the location of the pre-project mean high water shoreline. Storm damage is defined as losses incurred by the temporary deterioration of a given amount of shoreline as a direct result of erosion which is caused by a storm of a given magnitude and frequency. In this analysis, damages to buildings, pools, patios, parking lots, utilities, seawalls, revetments, bulkheads, and backfill are considered.

D-20. Specification of Risk. The Risk and Uncertainty Storm Damage Model Version 0.2 is capable of incorporating the uncertainty associated with the quantification of specific input parameters into estimates of storm-induced damages. Using a deterministic approach, the storm damage model generates many multi-year simulations of possible storm and recession damages to the study area. In other words, the RU SDM randomly produces multiple repetitions of multi-year damage scenarios. For example, every project alternative modeled in Segment III required 3,000 randomly generated simulations each representing possible average annual damages incurred during a 50-year project life. Simulations for with and without project conditions are then statistically compared to yield average annual storm damage reduction benefits.

D-21. For each 50-year simulation, the RU SDM randomly generates input parameters based upon uncertainty values specified by the user. Input parameters whose uncertainties are considered by the storm damage model include a) coastal armor cost b) structure value c) backfill cost d) coastal armor protective level e) future shoreline position f) structure setback and g) recession associated with a given storm event.

D-22. Storm Frequency and Shoreline Recession. To estimate storm damages, a relationship is developed between storm frequencies and shoreline recession using the storm response model SBEACH and the empirical simulation technique (EST) outlined in Appendix B. The uncertainty associated with a given level of recession is computed as one standard deviation, calculated directly from EST output. Shoreline recession due to storms is defined as the distance from a pre-storm baseline to the landward limit of 0.5-foot erosion following a weather event. Computed shoreline recession estimates along with the probability of occurrence associated with each storm event are used to assign a frequency of storm-induced shoreline recession to storms of varying magnitude. The probability of an occurrence for each event is defined on the basis that a storm event could be equaled or exceeded in any given year.

D-23. Shoreline Recession and Future Damages. The shoreline recession-damage relationship has been formulated to account for the expected shoreline position in future years with respect to the reference shoreline. The location and uncertainty of future shoreline positions were estimated using measured historical erosion rates along with the calculated statistical deviation of those measurements. In this investigation the historical erosion rate was programmed to vary from 4 to 10 feet per year along the Segment III shoreline. Statistical uncertainty associated with this erosion rate varies from 3 to 8 feet per year. The storm damage model halts future long-term recession at the year an existing seawall or protective structure is encountered. For each iterative cycle, predicted damages were converted to average annual equivalent values using the 2001 direct interest rate of 6 and 1/8 percent over the 50-year period of analysis.

D-24. In this analysis, the storm damage model predicts 3,000 randomly generated values of storm-induced damage for each with and without project alternative. A sensitivity analysis was conducted to determine an appropriate number of model iterations. The analysis consisted of running the RU SDM for 5,000 iterations and plotting the standard deviation as a function of iteration number. It was found that the standard deviation of storm damages stabilizes after about 3,000 iterations. The random damage reduction predicted by the storm damage model is the difference between with and without project damages for each random iteration. Storm-induced damages are computed for each iterative cycle by relating the distance and frequency of storm-induced recession to the location of the upland development. The location (i.e., setback) of the upland development was estimated using aerial photographs dated March 1999. Using the relationship between the positions of upland development and the frequency of occurrence of shoreline recession, the frequency and magnitude of storm damage is estimated. Average annual equivalent damages for each alternative are determined by integrating the frequency-damage curve. Storm-induced shoreline recession is simulated by the storm damage model, and average annual equivalent damages for the without and with project conditions were amortized and discounted in a manner consistent with shoreline recession damage estimates. The average of all iterative cycles was used in forming comparisons between differing project alternatives. Confidence limits were placed around the average benefits on the basis of percent occurrence of the random benefit values.

General Model Assumptions

a) The relationship of probability to shoreline recession is randomly assigned based upon input uncertainty levels.
b) Damage to improvements will not occur until shoreline recession has exceeded the seaward edge of the improvement.
c) When the shoreline erodes to the full value point of a structure the structural value of the first two floors is considered lost. The full value point has been defined as that which must be exceeded by shoreline recession (storm-induced or otherwise) in order to incur 100 percent damage to the structure.
d) Improvements which were permitted and constructed under the Coastal Construction Program specifically Section 161.041 and Part IV of Chapter 373,

Florida Statutes, and Rule 62B-41 of the Florida Administrative Code are assumed to be able to withstand complete erosion of their substrate and remain structurally sound; thus, the full value point of such structures is considered to be the distance from the reference shoreline to 100 percent of the structure depth. Should full value be realized, only the structural value of the first two floors is considered lost.

e) Structures not constructed under the guideline required by the aforementioned legislation are assumed to have a full value point equal to the distance from the reference shoreline to 50 percent of the structure depth.
f) The full value point of a swimming pool is reached once the shoreline erodes a distance of one foot beyond the pool's seaward edge.
g) If a structure is undermined, damage is assumed to be equal to the product of the structural value available for damage calculations and the ratio of the horizontal distance eroded through the structure and the full value distance of the structure.
h) All market values of improvements are replacement cost new less depreciation.
i) Structure contents damage is not evaluated in this report.
j) Repair cost to the coastal armor and the cost of backfill is based upon current engineering estimates. Backfill repair is valued at $12 per cubic foot.
k) After structural failure occurs, the shoreline development, roads, and parking lots will be repaired to a condition similar to and in the same location as the project conditions. The roadway value is based upon a gross estimate of the time and materials required to repair an asphalt surface. The roadway is valued at $2.25 per square foot.
l) Structures currently without coastal armor in immediate danger of sustaining storm damage shall be protected from damage caused by subsequent storms through the construction of coastal armor in compliance with current legislative requirements.

Storm Damage Model Input

D-25. Data input to the storm damage model include existing and future shoreline position, storm frequency and corresponding recession, risk and uncertainty estimates, coastal armor information, along with a detailed structural inventory. A partial input file is shown in Table D-2 and has been supplemented with explanations of various input items. The complete storm damage model input files used in this analysis are attached in Sub-appendix D-1 and include a structural inventory, shoreline position, frequency versus recession distances, coastal armor types, and estimates of uncertainty associated with modeled parameters.

D-26. Shoreline Position. Damages to the upland development with no project in place are based upon pre-construction (1977) conditions. To simulate the normal erosion process, the storm damage model requires a database of expected future shoreline positions and their level of uncertainty. The uncertainty of shoreline locations is computed as the standard deviation of measured historical shoreline positions. The storm damage model assumes shoreline location varies according to a normal distribution centered about the mean shoreline position. The location and standard deviation of future

Table D-2: Sample storm damage model input data file.

START YEAR - 2001 **DURATION - 50-yrs**

SHORELINE POSITION INFORMATION

Historic Erosion Rate (ft/yr)	-4				
Shoreline Position (years 1-5)	0	4	8	12	16
Shoreline Position (years 6-10)	20	24	28	32	36
Shoreline Position (years 11-15)	40	44	48	52	56
Shoreline Position (years 16-20)	60	64	68	72	76
Shoreline Position (years 21-25)	80	84	88	92	96
Shoreline Position (years 26-30)	100	104	108	112	116
Shoreline Position (years 31-35)	120	124	128	132	136
Shoreline Position (years 36-40)	140	144	148	152	156
Shoreline Position (years 41-45)	160	164	168	172	176
Shoreline Position (years 46-50)	180	184	188	192	196

STORM DAMAGE

PROBABILITY	RECESSION (ft)
0	177
0.01	160.5
0.02	129
0.05	90
0.1	80
0.2	71
0.5	58.5
1	33

COASTAL ARMOR

ARMOR DESCRIPTION	COST	PROTECTION LEVEL	HALT EROSION	PERCENT REPLACEMENT	ID NUMBER
'CSP-SMALL CAPPED '	625	71	1	1	1
'CSP-MEDIUM CAPPED '	750	75.5	1	1	2
'CSP-LARGE CAPPED '	850	80	1	1	3
'CSP-SMALL CAPPED W/TOE '	0	0	1	1	4
'CSP-MEDIUM CAPPED W/TOE '	0	0	1	1	5
'CSP-LARGE CAPPED W/TOE '	0	0	1	1	6
'ROCK REVETMENT-SMALL '	0	0	1	1	7
'ROCK REVETMENT-LARGE '	0	0	1	1	8
'DUMMY '	0	0	0	0	9
'DUMMY '	0	0	0	0	10
'DUMMY '	0	0	0	0	11
'DUMMY '	0	0	0	0	12
'RUBBLE - SMALL '	200	75.5	0	0.65	13
'RUBBLE - LARGE '	0	0	0	1	14
'DO NOTHING '	0	0	0	0	15
'ROCK REVETMENT-MEDIUM '	0	0	0	0	16

Cost of Backfill - 1.33

STRUCTURAL INVENTORY

PROPERTY DESCRIPTION	VALUE	LOT WIDTH	# FLOORS	EXISTING ARMOR	REPLACEMENT ARMOR	DIST. TO ARMOR
'PRESIDENTIAL 514224010400'	20188188	352	16	3	3	68
'HOLIDAY INN 514224010401'	8019804	245	5	3	3	39
'CONDOS BLDG #1 514224BB'	16860902	250	18	1	1	25
'BUILDING #2'	16610902	250	18	15	15	285
'PARKING LOT'	79650	120	1	1	1	30
'AQUARIUS 514224010420'	14732190	238	15	2	2	32
'OCEAN VIEW 514224010430'	4382364	240	5	1	1	36
'ALEXANDER 514224010450'	14287800	281	15	1	1	39

STRUCTURAL INVENTORY (CONTINUED)

PROPERTY DESCRIPTION	DIST TO STRUCTURE	DIST TO FULL VALUE	LAND TYPE	LAND LOSS	DUPLICATE	DNR	CONDEMN
'PRESIDENTIAL 514224010400'	68	290	'VC'	-1	0	'120'	1
'HOLIDAY INN 514224010401'	55	260	'VC'	-1	0	'120'	1
'CONDOS BLDG #1 514224BB'	45	170	'VC'	-1	1	'121'	1
'BUILDING #2'	305	418	'VC'	-1	1	'121'	1
'PARKING LOT'	28	170	'VC'	-1	0	'121'	1
'AQUARIUS 514224010420'	35	320	'VC'	-1	0	'121'	1
'OCEAN VIEW 514224010430'	35	215	'VC'	-1	0	'121'	1
'ALEXANDER 514224010450'	35	285	'VC'	-1	0	'121'	1

shoreline positions in this modeling study are based upon historical erosion rates of 10 ± 8 feet per year in John U. Lloyd and 4 ± 3 feet per year in Hollywood and Hallandale Beach. Shoreline data are simulated under the assumption that the shoreline position will be maintained at the initial project location throughout the life of the project.

D-27. Simulation of shoreline change due to storms is controlled through the input of shoreline recession values, the uncertainty of these values, and their probability of occurrence. In order to calculate the storm erosion frequency parameters during each iteration, the storm damage model calculates an error term based on a normal distribution of mean 0 and standard deviation of 1. The error term is then multiplied by the input standard deviations for each of the erosion distances and the derived recession value is computed as

Computed Recession = Mean Recession + ((standard deviation)*error term)

It is important to note that the frequency of occurrence values remain constant for each simulation, only the respective recession distances vary. These relationships are shown in Table D-3 for each of the sub-reaches modeled in Segment III.

Table D-3: Storm damage model input shoreline recession data for Segment III sub-reaches.

Return Period (yr)	REACH			
	R-86 to R-94		R-101 to R-128	
	MEAN (ft)	STANDARD DEVIATION (ft)	MEAN (ft)	STANDARD DEVIATION (ft)
200	187	16	177	10
100	171	14.9	160.5	10
50	148	13.4	129	10.4
20	103	10.7	90	13
10	65	9.9	80	12.8
5	52	9.9	71	13.2
2	41	10	58.5	14.2
1	26.5	2	33	3

D-28. Structural Inventory. Lot widths and structural setbacks were assigned and measured from aerial photographs dated March 1999 where lot boundaries generally correspond with the boundaries of structural features. The uncertainty associated with measuring structural setbacks in this fashion is assumed to be the setback distance ± 1 foot. Property amenities, coastal armor presence, and number of floors were field

verified in August 1999. Coastal armor is grouped and categorized by unit cost, level of protection and the ability to halt erosion. Armor type is categorized based on field inspection utilizing engineering judgment and reflects the mean protective value of each armor class (Table D-2). For each iterative cycle, a protection level is randomly selected from input values representing minimum and maximum levels of armor protection. Minimum and maximum protection levels were calculated according to the assumption that their values respectively reflect 75 and 125 percent of the mean. Mean unit replacement cost per linear foot was based on engineering cost estimates. The damage factor is a measure of armor repair needed after failure.

D-29. Value estimates were developed for the oceanfront properties (primarily structural improvements) as well as the second row structures. A Jacksonville District staff appraisal provided structural values for use in the determination of storm damage for first and second row structures.

D-30. Armor Costs and Structural Values at 95% Uncertainty. This is a single global value of uncertainty, applied to the unit cost for each armor type and each structural value. For this modeling effort, the uncertainty at 95% confidence is input as 0.1 for both armor costs and structural values. The storm damage model uses these uncertainty values to compute a standard deviation for each iterative cycle as

$$\text{Standard Deviation at 95\% Confidence} = (0.1 * \text{value})/1.96$$

This formulation is repeated for each armor cost and structural value. The resulting standard deviation is applied assuming a normal distribution centered about the mean value.

D-31. Standard Deviation of Backfill Cost. Uncertainty relating to the cost of backfill in the study area was based upon engineering judgment. A standard deviation of $2 per cubic foot of backfill is applied in a normal distribution about the mean value of $12 per cubic foot to calculate the backfill cost applied during each iterative cycle. The storm damage model requires backfill be input in units of square feet, resulting in an input value of $\$1.33 \pm 0.22$. Backfill is assumed to be three feet deep.

D-32. Navy Infrastructure. The Navy's Surface Warfare Center located adjacent to Port Everglades incurs continued damage to its infrastructure along the intertidal beach and nearshore area. It is estimated that $80,000 per year is expended by the Navy for repairs to the cable field due to wave and storm damage. Coverage of this cable field in the intertidal zone and nearshore area by sand will completely eliminate these continued damages to the cables. Therefore an additional average annual storm damage benefit of each alternative considered of $80,000 is included in this storm damage reduction analysis. Costs required to repair storm damage to the upland seawall are included in the storm damage model.

Loss of Land Benefits

D-33. Prevention of loss of land associated with shoreline stabilization in Segment III is based upon a nearshore land value of $25 per square foot. The real estate division of the Jacksonville USACE District Office determined the value of nearshore land. Evaluation of benefits at Federally owned and non-federal public shores must reflect their special use to which the shore is dedicated, and the value of output produced by the use. Normally, non-Federal public shores are dedicated to park and conservation areas, and the benefits for protecting such shores are based on the loss of in recreation outputs. Private lands subject to erosion are the lands between the pre-project MHW line and the existing or future line of coastal armor. Construction of the project will prevent the loss of both the public and private lands. Public loss of land benefit is not claimed since the primary output of these non-Federal public shores is recreation.

Seed Number

D-34. Input parameters are randomly selected each time the storm damage model begins a new iterative cycle. Reproduction of identical input strings used in complete simulations is essential in effectively comparing damages estimated between with and without project conditions. A seed number may be input into the storm damage model that initiates random number generation and consequently selects input parameters. Using a consistent seed value for each project simulation provides a method of achieving perfect correlation between multiple sets of randomly selected input parameters. The assumption that perfect correlation exists between output data sets is assumed correct due to the perfect correlation of input values provided by supplying a constant seed value. For this investigation, the default seed number of 1701 was input for each simulation.

Summary of Primary Benefits

D-35. The average annual damages and benefits for Segment III are included in Table D-4. Benefits for each design beach width configuration are computed as the average of the iteration-by-iteration difference between the damages that are computed to occur with and without project construction. A confidence interval plan has been established on the basis of percent occurrence of these random damage reduction benefit values. Table D-4 likewise presents the 5% and 95% percentiles for benefits attributed to each design beach width. These percentiles represent the frequency with which damage reduction benefits are greater than or equal the displayed benefit value.

Table D-4: Average annual damages and benefits along the Segment III shoreline.

Component	Average Damages	Average Benefits	95% Chance of Benefits Exceeding	5% Chance of Benefits Exceeding
		No-Project		
Structural	$11,662,600			
Armor	$1,165,800			
Backfill	$409,800			
Land Loss	$572,400			
TOTAL	$13,810,600			
		25-Foot Design Berm		
Structural	$1,168,700	$10,574,000		
Armor	$103,000	$1,062,800		
Backfill	$244,300	$165,500		
Land Loss	$0	$572,400		
TOTAL	$1,515,900	$12,374,700	$3,997,196	$25,826,902
		50-Foot Design Berm		
Structural	$451,200	$11,291,300		
Armor	$40,500	$1,125,300		
Backfill	$109,900	$299,900		
Land Loss	$0	$572,400		
TOTAL	$601,700	$13,288,900	$4,471,478	$27,994,570
		75-Foot Design Berm		
Structural	$170,700	$11,571,900		
Armor	$14,600	$1,151,200		
Backfill	$34,600	$375,200		
Land Loss	$0	$572,400		
TOTAL	$219,900	$13,670,700	$4,599,325	$28,594,318

MAXIMUM NET PRIMARY BENEFITS (NED SELECTION)

D-36. The optimum or NED project configuration is that which maximizes the primary net project benefits. The net benefits are the difference between average annual primary benefits and the annual costs of each project alternative. For the purposes of this reevaluation investigation, the project design berm width for those reaches of the Segment III shoreline that have been previously constructed was varied to determine the optimum project dimensions under current economic conditions. The project berm width was varied between 25 and 75 feet.

D-37. The primary benefits for each design berm width were summarized and compared to the respective project costs. The primary benefits, costs, and net primary benefits for each of these project configurations are summarized in Table D-5. Considering a project life of 50 years and interest rate of 6 and 1/8 percent, the 50-ft design beach produces the maximum net primary benefits.

Table D-5: Optimum Segment III design beach width.

	Project Extension		
	25-ft	50-ft	75-ft
Primary Benefits	$12,374,700	$13,288,900	$13,670,700
Costs	$2,692,000	$3,151,000	$3,835,000
Net Primary Benefits	$9,682,000	$10,137,900	$9,835,700

INCIDENTAL BENEFITS

Recreational Benefits

D-38. Recreational usage of the beaches in Segment III contributes millions of dollars annually to the local economy of Broward County, the State of Florida, and the Nation. Generation of recreational benefits is not a primary project purpose, but all benefits associated with Federal shore protection projects are evaluated in order to determine the net benefits generated by the projects. In order to identify the recreational benefits generated by the reevaluated authorized plan, with and without project saltwater beach demands in Broward County were projected through the year 2050 in ten-year increments. These beach demands were then compared with beach capacity for with and without project conditions throughout 50-year duration of the project. The travel cost method was then used to determine an average cost per beach visit and assign a dollar value to visits attributable to the proposed project. The average annual value of beach visits attributed to the project is the recreational benefit.

D-39. Annual Beach Activity. Annual beach activity on a countywide basis is a combination of Broward County resident, other Florida resident, and tourist participation. The countywide saltwater beach demand for Broward County, CD, was determined by

$$CD = (P_C N_c + P_s N_s + P_t N_t)K$$

where,

P_c = constant from State SCORP, denotes participation rate by county residents.
N_c = county population from State Statistical Abstract.
P_s = constant from State SCORP, denotes participation from residents of other Florida counties who recreate on Broward County beaches.
N_s = State population, less Broward County Population, from State Statistical Abstract.
P_t = constant from State SCORP, denotes participation rate for tourists who visit Broward beaches.
N_t = Tourist population for Broward County, from Florida Department of Natural Resources.
K = constant as determined from actual counts.

D-40. Table D-6 shows the projected population and demand for Broward County as provided by various State of Florida agencies. The 1998 Florida Statistical Abstract is a compilation of timely economic and demographic information from which the county and state population projections were taken. These projections include the years 1995 through 2020, and linear interpolation was used to estimate populations for the years 2030, 2040 and 2050. Tourist populations for Broward County in years 1995 and 2000 were provided by the Jacksonville District Office and based upon State Comprehensive Outdoor Recreation Planning (SCORP) county and statewide projections. The demand constant for county resident per capita participation was derived from a 1985 survey of 245 residents, whereas 792 tourists were interviewed to arrive at the tourists per capita participation rate (USACE, 1990). Participation rates are shown in Table D-6.

Table D-6: Beach demand for Broward County and Segment III.

	YEAR						
	1995	2000	2010	2020	2030	2040	2050
Resident Population	1364.2	1493.0	1707.8	1926.6	2161.0	2387.9	2614.8
Resident Demand	6230.3	6818.5	7799.5	8798.8	9869.4	10905.6	11941.9
Other Florida Population	12785.1	14019.9	16220.1	18482.6	20692.7	25309.3	27764.8
Other Florida Demand	1183.8	1295.5	1481.9	1671.8	1875.2	2072.1	2269.0
Tourist Population	3221.0	3525.1	4032.3	4548.9	5102.4	5625.2	6156.1
Tourist Demand	9959.3	10899.6	12467.8	14065.1	15776.6	17393.0	19034.8
Total Demand	17373.4	19013.7	21749.2	24535.7	27521.1	30370.7	33245.6
Segment III Demand	6358.7	6959.0	7960.2	8980.1	10072.7	11130.3	12187.9
JUL Demand	600.0	656.6	751.1	847.4	950.5	1050.3	1150.0
Dania Demand	378.8	414.6	474.2	535.0	600.1	663.1	726.1
H/H Demand	4812.4	5266.8	6024.5	6796.4	7623.4	8423.8	9224.2

Resident Participation	4.567
Tourist Participation	3.092
Other Florida Demand	0.19

The value of K is an adjustment factor for the SCORP data that enables actual beach counts to be included in the analysis. Due to good correlation between SCORP demand for Segment III and actual beach counts, a K value of one was used. Demand within Segment III was found by separating the entire reach into two sub-segments and computing demand based upon each regions' respective percent of county-wide beach use as determined by Broward County for 1995 (BDNRP, 1997). John U. Lloyd and Dania Beach demand was separated by dividing the combined sub-regional total beach usage based upon beach counts taken by county officials in John U. Lloyd Beach State Recreation Area and Dania Beach.

D-41. Daily Beach Activity Demand. Daily beach activity demand varies considerably from day-to-day with the greatest demand occurring on weekends, holidays and other special events. Daily demand also varies seasonally throughout the year. The distribution of daily beach demand is determined by performing a frequency analysis on actual beach activity data collected within the study area where possible. Once this distribution is determined, annual beach activity demand can be confidently distributed into daily demand.

D-42. The daily attendance record for one-year (January 1, 1998 to December 31, 1998) along the Hollywood shorefront was the basis for this frequency analysis. The Broward County Department of Planning and Environmental Protection supplied daily beach count data. Results indicate that there are 10 user groups characterizing beach attendance in Broward County during the 364 days in 1998 when records were kept. The 10 user groups identified are shown in Table D-7.

Table D-7: Daily beach activity demand.

User Group	Percent of Total	Number of Days	1998	2000	2010	2020	2030	2040	2050	% Annual Total
1	2.27	2	114592	148841	170255	192068	215438	238058	260678	4.55
2	1.08	4	54184	70379	80504	90818	101869	112565	123260	4.30
3	0.82	4	41544	53960	61724	69632	78104	86305	94505	3.30
4	0.68	17	34151	44358	50740	57240	64205	70947	77688	11.52
5	0.53	23	26471	34383	39329	44368	49767	54992	60217	12.08
6	0.45	26	22657	29428	33662	37975	42596	47068	51540	11.69
7	0.35	50	17495	22724	25994	29324	32892	36345	39799	17.36
8	0.24	59	12334	16020	18325	20673	23188	25623	28057	14.44
9	0.14	133	6972	9029	10329	11652	13070	14442	15814	18.35
10	0.05	46	2628	3414	3905	4406	4942	5461	5979	2.40
		364								100

D-43. With and Without Project Beach Capacity. After daily beach demand has been considered, with and without project beach capacities were analyzed to pinpoint constraints that might limit full participation. Capacity of the beaches in Segment III can be limited by beach area, available access points, and the ability of the public to use public access points. Availability of public parking within a reasonable distance from access points to the shoreline must be open to the public on equal terms. It was assumed that on average, there will be four people in a car and each parking space is turned over twice per day. Thus, each parking space is able to accommodate eight people per day. The resulting increased parking capacity is referred to as “notional” parking. Inventory of public parking spaces and public beach access points were taken using 1999 aerial photographs. For calculation purposes, consolidation of the 75 parking lots, 4,356 parking spaces, and 115 recognized beach access points contained in Segment III was necessary; thus, total public parking spaces and beach access points have been grouped by sub-reach. There are two large, multi-deck parking garages in Hollywood/Hallandale Beach that account for approximately 1,490 individual parking spaces. Because there is ample surrounding infrastructure that is not directly related to beach recreation, assuming that each of these parking spaces would be utilized for beach access is not reasonable. In

order to determine the sensitivity of this analysis to garage usage, recreation benefits for both with and without garage conditions are included herein. However, in order to maintain conservative projections, recreation benefits realized for the without parking garage alternative were considered for project optimization calculations. The resulting without and with project capacities (no parking garages) for the Segment III beaches are shown in Tables D-8 and D-9. A detailed inventory summarizing the specific location of each Segment III public beach access and public parking space is presented in the main text of this report (see Plates 15 through 29).

D-44. Without project beach widths represent pre-project conditions and were taken from aerial photographs and surveys performed in 1976. Beach width is measured from the MHW line to the vegetation line. With project conditions assume that a 50-foot extension of the ECL would be maintained throughout the life of the project in northern John U. Lloyd and Hollywood/Hallandale Beach respectively. The resulting with project MHW location was estimated using computed post-equilibrium beach widths superimposed upon existing conditions. Additionally, a turnover rate of two beach users per 100 square feet of dry beach per day was used in developing capacity estimates.

D-45. In the analysis, beach area necessary to provide space for each beach user anticipated by the available notional parking was compared to the actual beach area provided by with and without project conditions. Excess demand was computed by comparing with and without project capacities with daily beach demands for each user group and simulation year. Excess demand met by the with-project condition can be considered to be the additional visitors attributable to the project. Results are shown for a 50-foot project and each incremental project year in Table D-10.

Table D-8: Broward County, Segment III beach capacity projections (without project).

WITHOUT PROJECT DAILY BEACH CAPACITY

	APPROX. PUBLIC PARKING SPACES	PARKING & NOTIONAL CAPACITY (VISITS)	APPROX. PUBLIC SHOREFRONT (FEET)	1995		2000		2010		2020		2030		2040		2050		SHORELINE EROSION RATE (FT/YR)
				WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	
JUL	1221	9768	8138	45	7324	11	1790	0	0	0	0	0	0	0	0	0	0	-6.8
Dania	529	4232	3007	60	3608	48	2857	23	1353	0	0	0	0	0	0	0	0	-2.5
Hollywood / Hallandale	2606	20848	26820	55	20848	35	18774	0	0	0	0	0	0	0	0	0	0	-4
TOTALS	4356	34848	37965		31781		23421		1353		0		0		0		0	

Table D-9: Broward County, Segment III beach capacity projections (with 50-foot project).

WITH PROJECT DAILY BEACH CAPACITY

	APPROX. PUBLIC PARKING SPACES	PARKING & NOTIONAL CAPACITY (VISITS)	APPROX. PUBLIC SHOREFRONT (FEET)	1995		2000		2010		2020		2030		2040		2050	
				WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)	WIDTH (FEET)	CAPACITY (VISITS)
JUL	1221	9768	8138	95	9768	95	9768	95	9768	95	9768	95	9768	95	9768	95	9768
Dania	529	4232	3007	60	3608	60	3608	60	3608	60	3608	60	3608	60	3608	60	3608
Hollywood / Hallandale	2606	20848	26820	105	20848	105	20848	105	20848	105	20848	105	20848	105	20848	105	20848
TOTALS	4356	34848	37965		34224		34224		34224		34224		34224		34224		34224

Table D-10: Project benefit (additional beach visitors).

1995

Without Project Capacity:

JUL	Dania	H/H
7324	3608	20848

With Project Capacity:

JUL	Dania	H/H
9768	3608	20848

				1995 Demand/day			Without Project Annual			With Project Annual			Additional Annual Visits		
User Group	Percent of Total	Number of Days	% Annual Total	JUL	Dania	H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	JUL Benefit	Dania benefit	H/H benefit
1	2.274	2	4.55	13646	8616	109450	12643	10015	177204	7756	10015	177204	4888	0	0
2	1.075	4	4.30	6452	4074	51753	0	1862	123620	0	1862	123620	0	0	0
3	0.825	4	3.30	4947	3124	39680	0	0	75327	0	0	75327	0	0	0
4	0.678	17	11.52	4067	2568	32619	0	0	200099	0	0	200099	0	0	0
5	0.525	23	12.08	3152	1990	25283	0	0	102011	0	0	102011	0	0	0
6	0.450	26	11.69	2698	1703	21640	0	0	20594	0	0	20594	0	0	0
7	0.347	50	17.36	2083	1315	16710	0	0	0	0	0	0	0	0	0
8	0.245	59	14.44	1469	927	11780	0	0	0	0	0	0	0	0	0
9	0.138	133	18.35	828	523	6640	0	0	0	0	0	0	0	0	0
10	0.052	46	2.40	313	198	2511	0	0	0	0	0	0	0	0	0
TOTAL		364	100	600000	378827	4812429	12643	11877	698855	7756	11877	698855	4888	0	0

2000

Without Project Capacity:

JUL	Dania	H/H
1790	2857	18774

With Project Capacity:

JUL	Dania	H/H
9768	3608	20848

				2000 Demand/day			Without Project Annual			With Project Annual			Additional Annual Visits		
User Group	Percent of Total	Number of Days	% Annual Total	JUL	Dania	H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	JUL Benefit	Dania benefit	H/H benefit
1	2.274	2	4.55	14934	9429	119784	26288	13145	202020	10333	11642	197872	15955	1504	4149
2	1.075	4	4.30	7062	4459	56639	21085	6408	151462	0	3401	143165	21085	3007	8297
3	0.825	4	3.30	5414	3418	43426	14495	2247	98609	0	0	90312	14495	2247	8297
4	0.678	17	11.52	4451	2810	35698	45227	0	287717	0	0	252454	45227	0	35263
5	0.525	23	12.08	3450	2178	27670	38169	0	204624	0	0	156914	38169	0	47709
6	0.450	26	11.69	2953	1864	23683	30222	0	127647	0	0	73715	30222	0	53932
7	0.347	50	17.36	2280	1440	18288	24486	0	0	0	0	0	24486	0	0
8	0.245	59	14.44	1607	1015	12893	0	0	0	0	0	0	0	0	0
9	0.138	133	18.35	906	572	7267	0	0	0	0	0	0	0	0	0
10	0.052	46	2.40	343	216	2748	0	0	0	0	0	0	0	0	0
TOTAL		364	100	656649	414593	5266791	199972	21800	1072080	10333	15042	914431	189639	6758	157648

2010

Without Project Capacity:

JUL	Dania	H/H
0	1353	0

With Project Capacity:

JUL	Dania	H/H
9768	3608	20848

				2010 Demand/day			Without Project Annual			With Project Annual			Additional Annual Visits		
User Group	Percent of Total	Number of Days	% Annual Total	JUL	Dania	H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	JUL Benefit	Dania benefit	H/H benefit
1	2.274	2	4.55	17083	10786	137017	34166	18865	274035	14630	14355	232339	19536	4511	41696
2	1.075	4	4.30	8078	5100	64788	32310	14987	259152	0	5966	175760	32310	9021	83392
3	0.825	4	3.30	6193	3910	49674	24773	10228	198695	0	1207	115303	24773	9021	83392
4	0.678	17	11.52	5091	3214	40834	86548	31641	694181	0	0	339765	86548	31641	354416
5	0.525	23	12.08	3946	2492	31651	90763	26183	727981	0	0	248477	90763	26183	479504
6	0.450	26	11.69	3378	2133	27091	87817	20264	704354	0	0	162306	87817	20264	542048
7	0.347	50	17.36	2608	1647	20919	130406	14678	1045950	0	0	3550	130406	14678	1042400
8	0.245	59	14.44	1839	1161	14747	108482	0	870100	0	0	0	108482	0	870100
9	0.138	133	18.35	1036	654	8312	137832	0	1105514	0	0	0	137832	0	1105514
10	0.052	46	2.40	392	247	3143	18025	0	144572	0	0	0	18025	0	144572
TOTAL		364	100	751122	474242	6024532	751122	136847	6024532	14630	21529	1277499	736492	115319	4747033

Table D-10: Project benefit (additional beach visitors) (cont'd).

2020

Without Project Capacity:

JUL	Dania	H/H
0	0	0

With Project Capacity:

JUL	Dania	H/H
9768	3608	20848

				2020 Demand/day			Without Project Annual			With Project Annual			Additional Annual Visits		
User Group	Percent of Total	Number of Days	% Annual Total	JUL	Dania	H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	JUL Benefit	Dania benefit	H/H benefit
1	2.274	2	4.55	19272	12168	154572	38543	24335	309143	19007	17118	267447	19536	7217	41696
2	1.075	4	4.30	9112	5753	73088	36450	23014	292354	0	8580	208962	36450	14434	83392
3	0.825	4	3.30	6987	4411	56038	27947	17645	224151	0	3211	140759	27947	14434	83392
4	0.678	17	11.52	5743	3626	46066	97637	61646	783118	0	303	428702	97637	61343	354416
5	0.525	23	12.08	4452	2811	35706	102391	64647	821248	0	0	341744	102391	64647	479504
6	0.450	26	11.69	3810	2406	30561	99068	62549	794594	0	0	252546	99068	62549	542048
7	0.347	50	17.36	2942	1858	23599	147113	92884	1179955	0	0	137555	147113	92884	1042400
8	0.245	59	14.44	2074	1310	16637	122380	77268	981576	0	0	0	122380	77268	981576
9	0.138	133	18.35	1169	738	9377	155491	98174	1247150	0	0	0	155491	98174	1247150
10	0.052	46	2.40	442	279	3546	20334	12838	163094	0	0	0	20334	12838	163094
TOTAL		364	100	847354	535000	6796383	847354	535000	6796383	19007	29213	1777716	828347	505788	5018667

2030

Without Project Capacity:

JUL	Dania	H/H
0	0	0

With Project Capacity:

JUL	Dania	H/H
9768	3608	20848

				2030 Demand/day			Without Project Annual			With Project Annual			Additional Annual Visits		
User Group	Percent of Total	Number of Days	% Annual Total	JUL	Dania	H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	JUL Benefit	Dania benefit	H/H benefit
1	2.274	2	4.55	21616	13648	173380	43233	27296	346759	23697	20080	305063	19536	7217	41696
2	1.075	4	4.30	10221	6453	81982	40885	25814	327927	1813	11380	244535	39072	14434	83392
3	0.825	4	3.30	7837	4948	62856	31347	19792	251426	0	5358	168034	31347	14434	83392
4	0.678	17	11.52	6442	4067	51671	109517	69147	878406	0	7804	523990	109517	61343	354416
5	0.525	23	12.08	4993	3153	40051	114850	72514	921176	0	0	441672	114850	72514	479504
6	0.450	26	11.69	4274	2698	34280	111122	70160	891279	0	0	349231	111122	70160	542048
7	0.347	50	17.36	3300	2084	26471	165014	104186	1323530	0	0	281130	165014	104186	1042400
8	0.245	59	14.44	2327	1469	18661	137271	86670	1101012	0	0	0	137271	86670	1101012
9	0.138	133	18.35	1311	828	10518	174411	110119	1398901	0	0	0	174411	110119	1398901
10	0.052	46	2.40	496	313	3977	22808	14401	182939	0	0	0	22808	14401	182939
TOTAL		364	100	950458	600099	7623356	950458	600099	7623356	25510	44622	2313656	924948	555476	5309700

2040

Without Project Capacity:

JUL	Dania	H/H
0	0	0

With Project Capacity:

JUL	Dania	H/H
9768	3608	20848

				2040 Demand/day			Without Project Annual			With Project Annual			Additional Annual Visits		
User Group	Percent of Total	Number of Days	% Annual Total	JUL	Dania	H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	JUL Benefit	Dania benefit	H/H benefit
1	2.274	2	4.55	23886	15081	191584	47772	30162	383167	28236	22946	341471	19536	7217	41696
2	1.075	4	4.30	11294	7131	90589	45178	28524	362357	6106	14091	278965	39072	14434	83392
3	0.825	4	3.30	8660	5467	69456	34638	21870	277824	0	7436	194432	34638	14434	83392
4	0.678	17	11.52	7119	4495	57096	121016	76407	970634	0	15064	616218	121016	61343	354416
5	0.525	23	12.08	5518	3484	44256	126908	80127	1017895	0	0	538391	126908	80127	479504
6	0.450	26	11.69	4723	2982	37879	122789	77527	984859	0	0	442811	122789	77527	542048
7	0.347	50	17.36	3647	2303	29250	182340	115125	1462494	0	0	420094	182340	115125	1042400
8	0.245	59	14.44	2571	1623	20621	151684	95770	1216612	0	0	0	151684	95770	1216612
9	0.138	133	18.35	1449	915	11622	192723	121681	1545778	0	0	0	192723	121681	1545778
10	0.052	46	2.40	548	346	4394	25203	15913	202147	0	0	0	25203	15913	202147
TOTAL		364	100	1050251	663106	8423768	1050251	663106	8423768	34342	59536	2832382	1015910	603569	5591385

Table D-10: Project benefit (additional beach visitors) (cont'd).

2050

Without Project Capacity:

JUL	Dania	H/H
0	0	0

With Project Capacity:

JUL	Dania	H/H
9768	3608	20848

				2050 Demand/day			Without Project Annual			With Project Annual			Additional Annual Visits		
User Group	Percent of Total	Number of Days	% Annual Total	JUL	Dania	H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	Excess Demand JUL	Excess Demand Dania	Excess Demand H/H	JUL Benefit	Dania benefit	H/H benefit
1	2.274	2	4.55	26156	16514	209788	52311	33028	419575	32775	25811	377879	19536	7217	41696
2	1.075	4	4.30	12368	7809	99197	49470	31235	396788	10398	16801	313396	39072	14434	83392
3	0.825	4	3.30	9482	5987	76056	37930	23948	304222	0	9514	220830	37930	14434	83392
4	0.678	17	11.52	7795	4922	62521	132515	83667	1062862	0	22324	708446	132515	61343	354416
5	0.525	23	12.08	6042	3815	48461	138967	87741	1114614	0	4747	635110	138967	82993	479504
6	0.450	26	11.69	5171	3265	41478	134457	84893	1078438	0	0	536390	134457	84893	542048
7	0.347	50	17.36	3993	2521	32029	199665	126064	1601457	0	0	559057	199665	126064	1042400
8	0.245	59	14.44	2815	1777	22580	166097	104870	1332213	0	0	102181	166097	104870	1230032
9	0.138	133	18.35	1587	1002	12727	211035	133243	1692655	0	0	0	211035	133243	1692655
10	0.052	46	2.40	600	379	4812	27598	17425	221354	0	0	0	27598	17425	221354
TOTAL		364	100	1150044	726113	9224179	1150044	726113	9224179	43174	79198	3453289	1106871	646915	5770889

D-46. Beach usage is limited by parking constraints in John U. Lloyd and Dania Beach for all project conditions. Because construction of new parking is not included in the shore protection works, not all of the excess demand can be met by the project. Beach capacity in Hollywood and Hallandale Beach is limited by a lack of public parking and public access to portions of Hallandale Beach. However, the unmet demand in Segment III is relatively small when compared to total demands on the beaches in Segment III.

D-47. Travel Cost Method. The final step in the recreational benefit analysis is to determine willingness to pay, or assign a value to the recreational usage generated by the proposed project. The travel cost method is based upon the assumption that as out-of-pocket and time costs incurred for traveling to the project area increase, the per capita participation of that recreation site will decrease. The average price associated with a visit to the site is arrived at through the consideration of costs of travel and the opportunity cost of the round trip to and from the site. Procedures for using the travel cost method include estimating use and deriving a demand curve for the project.

D-48. Estimating use of Broward County beaches was based upon data provided directly by the Jacksonville District, Corps of Engineers. Jacksonville District investigators have divided the site into six zones noting the travel distance from each zone to the beach. Participation and population estimates were formulated for each of the six zones within the study area. Once the participation rate as a function of travel distance was known, a demand curve representing beach demand vs. travel distance was developed. Total estimated visits in ten-mile increments are plotted in Figure D-2.

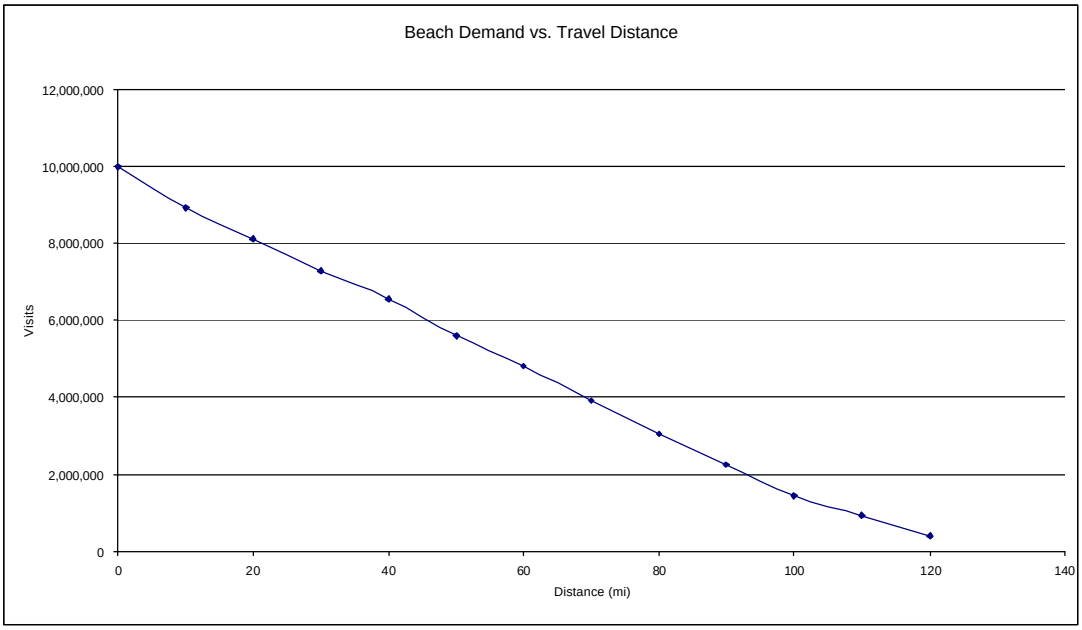

Figure D-2: Beach visitation as a function of increased travel distance.

D-49. The value of a beach visit was assigned a dollar value by considering the cost of owning and operating a vehicle and opportunity costs to the beach user. Operation costs have been updated using data from the American Automobile Association (1998). The American Automobile Association's updated variable cost (per mile) to operate an average automobile was estimated to be 10.7 cents in 1998.

D-50. The opportunity cost of time is computed by following procedures outlined in IWR Report 91-R-12 prepared by the USACE Institute for Water Resources (1991). In this report, the time saved during social/recreational trips on an hourly basis is valued as 60% of the hourly family income of the driver. The US Census Bureau found that the median income in the United States was $38,885 (U.S. Dept. of Commerce, 1998). Therefore, the hourly value of time saved per vehicle is computed as

$$\left[\left(\frac{\$38{,}885}{52}\right)\div 40\right]\times 0.60 = \$11.22 \quad \text{per vehicle per hour.}$$

Based on the *Florida Statistical Abstract* (1998), the median income family income in Broward County was $31,264. The hourly opportunity cost of time per Broward County visitor is computed by assuming 4 persons per vehicle per visit and is found by

$$\left(\frac{\$11.22\times\$31{,}364}{\$38{,}885}\right)\div 4 = \$2.26 \text{ per hour per visitor.}$$

The average cost per vist was computed by dividing the product of the area under the demand curve and the average cost of travel by the number of visits with no mileage increase. The average cost of a beach visit is $3.87 and was multiplied by the average annual increase in participation attributable to the project in order to find the average annual recreations benefit. The benefit stream of annual benefits for each year of the 50-year project were calculated in this manner, and from this point present worth of this stream were summed and discounted resulting in the average annual benefit. Average annual recreation benefits for the reevaluated authorized project (50-foot) along with +/- 25-foot extension variations are shown in Table D-11 while typical calculations used for the 50-foot scenario are presented in Table D-12. It is noted that the recreational benefits computed for the Dania Beach shoreline result from the shore stabilizing effects of sand feeding from the north and south. Therefore, it is assumed that the feeding effects will prevent continued erosion of the Dania Beach shoreline, thus perserving the recreational area.

Table D-11: Average annual recreation benefits ($) by project width.

Without Hollywood/Hallanale Beach parking garages:

JUL Width	25	JUL Width	50	JUL Width	75
Dania Width	0	Dania Width	0	Dania Width	0
H/H width	25	H/H width	50	H/H width	75
Reach	Benefit	Reach	Benefit	Reach	Benefit
JUL	1,865,600	JUL	1,865,600	JUL	1,865,600
Dania	667,600	Dania	667,600	Dania	667,600
H/H	10,183,200	H/H	10,183,200	H/H	10,183,200
TOTAL	12,716,400	TOTAL	12,716,400	TOTAL	12,716,400

With Hollywood/Hallanale Beach parking garages:

JUL Width	25	JUL Width	50	JUL Width	75
Dania Width	0	Dania Width	0	Dania Width	0
H/H width	25	H/H width	50	H/H width	75
Reach	Benefit	Reach	Benefit	Reach	Benefit
JUL	1,865,600	JUL	1,865,600	JUL	1,865,600
Dania	667,600	Dania	667,600	Dania	667,600
H/H	12,758,200	H/H	12,758,200	H/H	12,758,200
TOTAL	15,291,400	TOTAL	15,291,400	TOTAL	15,291,400

D-51. Projects in John U. Lloyd and Hollywood/Hallandale Beach are limited by the area's available parking and cannot generate additional recreational benefits without the construction of new parking facilities. Despite the absence of any authorized project in southern John U. Lloyd and Dania Beach (R-94 to R-101), some incidental benefits are realized. These benefits are due to the halt of shoreline erosion as a result of feeding from the terminal points of John U. Lloyd and Hollywood/Hallandale Beach nourishment efforts. Because the shoreline from R-94 to R-101 is not included in the reevaluated authorized project, adjacent benefits realized along this reach can not be included in optimization calculations.

D-52. Table D-12 was formulated by assuming the travel cost simulation begins at the first year of the Segment III project construction (1976) and runs for a 50-year project life. This assumption is consistent with the methodology used in the storm damage model investigation and obtains optimization through consideration of the most current data available. The simulation was run for a 50-year period to reevaluate benefit based upon current value and demand estimates while assuming no previous project construction.

Table D-12: Travel cost method for 50-foot project in Segment III.

Total Average Annual Recreation Benefits

Interest Rate: 6.125%
Project Life (yrs): 50
Capital Recovery Factor 0.06455398

Year	Visits Attributable to Project	Benefit ($)	Present Valuation ($)
1	**4,888**	18,900	17,800
2	74,719	289,200	256,800
3	144,551	559,400	468,000
4	214,382	829,700	654,100
5	284,214	1,099,900	817,100
6	**354,045**	1,370,200	959,100
7	878,525	3,399,900	2,242,600
8	1,403,005	5,429,600	3,374,600
9	1,927,485	7,459,400	4,368,600
10	2,451,965	9,489,100	5,236,600
11	2,976,444	11,518,800	5,989,800
12	3,500,924	13,548,600	6,638,700
13	4,025,404	15,578,300	7,192,700
14	4,549,884	17,608,100	7,660,600
15	5,074,364	19,637,800	8,050,600
16	**5,598,844**	21,667,500	8,370,000
17	5,674,239	21,959,300	7,993,100
18	5,749,635	22,251,100	7,631,900
19	5,825,031	22,542,900	7,285,700
20	5,900,427	22,834,700	6,954,100
21	5,975,823	23,126,400	6,636,500
22	6,051,219	23,418,200	6,332,300
23	6,126,614	23,710,000	6,041,200
24	6,202,010	24,001,800	5,762,600
25	6,277,406	24,293,600	5,496,000
26	**6,352,802**	24,585,300	5,241,000
27	6,396,534	24,754,600	4,972,500
28	6,440,267	24,923,800	4,717,600
29	6,483,999	25,093,100	4,475,500
30	6,527,731	25,262,300	4,245,600
31	6,571,463	25,431,600	4,027,400
32	6,615,196	25,600,800	3,820,200
33	6,658,928	25,770,100	3,623,500
34	6,702,660	25,939,300	3,436,800
35	6,746,393	26,108,500	3,259,600
36	**6,790,125**	26,277,800	3,091,400
37	6,832,199	26,440,600	2,931,000
38	6,874,273	26,603,400	2,778,800
39	6,916,347	26,766,300	2,634,500
40	6,958,421	26,929,100	2,497,500
41	7,000,495	27,091,900	2,367,600
42	7,042,568	27,254,700	2,244,400
43	7,084,642	27,417,600	2,127,500
44	7,126,716	27,580,400	2,016,600
45	7,168,790	27,743,200	1,911,400
46	**7,210,864**	27,906,000	1,811,700
47	7,242,245	28,027,500	1,714,600
48	7,273,626	28,148,900	1,622,600
49	7,305,007	28,270,400	1,535,600
50	7,336,388	28,391,800	1,453,100
		TOTAL	$ 196,989,100
	Annual Equivalent Benefit		$ 12,716,400

SUMMARY OF REEVALAUTED (NED) PLAN ECONOMICS

D-53. Although the optimum project is determined solely on primary benefits, the total project benefit is the combination of both primary and incidental benefits. A summary of the total average annual benefits for each project configuration included in the reevaluation of the NED plan are outlined in Table D-13. Again, the NED plan is that project configuration that produced the maximum net primary benefits. The total average annual benefits for the 50-ft shoreline extension (NED plan) are $26,005,300. These include $13,288,900 in primary benefits (storm damage and land loss reduction) and $12,716,400 in incidental benefits (recreation). Considering an average annual cost to construct and maintain this project for a 50-year project life of $3,151,000, the benefit-to-cost ratio for the NED plan is 8.3 to 1.0.

Table D-13: Summary of NED plan economics.

	Project Extension		
	25-ft	50-ft	75-ft
Primary Benefits	$12,374,700	$13,288,900	$13,670,700
Costs	$2,692,000	$3,151,000	$3,835,000
Net Primary Benefits	$9,682,700	$10,137,900	$9,835,700
Incidental Benefits	$12,716,400	$12,716,400	$12,716,400
Total Benefits	$25,091,100	$26,005,300	$26,387,100
BC Ratio	9.3 to 1.0	8.3 to 1.0	6.9 to 1.0

IMPLEMENTATION OF THE REEVALUATED (NED) PLAN (2002-2026)

D-54. The economics of implementing the reevaluated NED plan for the remainder of the project life are evaluated. To accomplish this, the shoreline and economic conditions expected at time of construction of the 2002 project and over the remaining project life cycle are considered. Since the John U. Lloyd and Hollywood/Hallandale Beach project reaches have been constructed and renourished once, a portion of the fill material remains along the project shoreline. Therefore, the next renourishment will not include the placement of the entire initial project requirement.

D-55. Evaluation of John U. Lloyd as Separable Element. It is noted that the density of shorefront development along Segment III is highly variable. The densest and most valuable shorefront development in Segment III is in Hollywood and Hallandale. Thus, these shoreline reaches generate most of the Segment III storm damage reduction benefits for the Segment III. Since Segment III was initially constructed as a continuous segment, the reevaluation treated the project as such. Thus, the John U. Lloyd reach was not evaluated as a separable element. For the purposes of implementation, however, an additional analysis was conducted to confirm that the John U. Lloyd Reach is justified as a separable project element. This analysis included consideration of the separable costs and benefits of the John U. Lloyd reach.

D-56. There is a relatively small amount of development along the John U. Lloyd project reach. The most notable development at that location is infrastructure associated with the Naval Surface Warfare Facility immediately downdrift of the Port Everglades south jetty. There are also scattered structures and other infrastructure associated with John U. Lloyd Beach State Recreation Area and Nova University. The John U. Lloyd project output includes storm damage reduction, recreation, and environmental enhancement and preservation. The latter two outputs are considered incidental.

D-57. The separable element evaluation for John U. Lloyd included consideration of three project alternatives. These are the 50-ft design berm as identified in the Segment III reevaluation, a 25-ft design berm, and a 0-ft design berm. The latter is essentially the periodic nourishment alternative where the pre-project shoreline is reestablished and maintained. The design berm would be situated along the previously constructed section of the John U. Lloyd reach between the south jetty and R-94. Six years of advance fill with overfill is applied to each alternative. A design berm wider than 50-ft is not considered due to the increased nearshore hardbottom impacts that would be associated with a wider berm. It is noted that reestablishment and maintenance of a 50-ft design berm along John U. Lloyd would impact approximately 10 acres of nearshore hardbottom based upon 2001 conditions.

D-58. A summary of the separable project economics for each alternative is included in Table D-14. The average annual project costs and benefits are based upon a 6 and 1/8 percent interest rate for the remaining 24 years of the project life. The details of the cost formulation are included in Sub-appendix B-3. The input files to the SDM-RU for the separable John U. Lloyd project evaluation are included in Sub-appendix D-2.

D-59. As indicated in the Table D-14, there are sufficient storm damage reduction benefits along the John U. Lloyd reach to justify sand placement at that location as a separable Segment III project element. However, reestablishment and maintenance of the 50-ft NED design berm at John U. Lloyd does not maximize the separable net primary benefits along that reach. Instead, reestablishment of pre-project shoreline conditions and periodic nourishment sufficient to maintain the pre-project shoreline produces the maximum net primary benefits. Therefore, the John U. Lloyd project will only include the reestablishment of the pre-project shoreline and the placement of periodic nourishment.

Table D-14: Summary of separable John U. Lloyd reach economics.

	Project Extension		
	0-ft	25-ft	50-ft
Primary Benefits	$1,028,000	$1,067,000	$1,096,000
Costs	$1,410,000	$1,735,000	$1,895,000
Net Primary Benefits	$ -382,000	$ -668,000	$ -799,000
Incidental Benefits	$1,432,000	$1,457,000	$1,457,000
Total Benefits	$2,460,000	$2,524,000	$2,553,000
BC Ratio	1.7 to 1.0	1.5 to 1.0	1.4 to 1.0

D-60. The quantified incidental benefits include recreation. The recreational benefits analysis for the John U. Lloyd separable evaluation was performed for a 24-year economic period using an interest rate of 6 and 1/8 percent. The analysis also considers current and proposed beach conditions without and with the project as well as current parking availability and the cost of a beach visit as determined by the travel cost method described herein. The results of the analysis are summarized in Table D-14 and detailed in Sub-appendix D-3.

D-61. Other benefits of the project not quantified in this analysis are the eco-system restoration, improvement and protection. These benefits specifically include the reestablishment and maintenance of sea turtle nesting habitat, protection of the thin beach barrier that fronts the upland and sensitive back marsh and mangrove areas.

D-62. Implementation of Plan. Considering the project beach conditions as of August 1998, approximately 1,540,000 cubic yards of sand will be required to reestablish and maintain the pre-project shoreline at John U. Lloyd and reconstruct and maintain the 50-ft design beach section along the Hollywood/ Hallandale Beach shoreline. This volume

includes design beach fill, advance nourishment, overfill, and material required to construction fill transitions as the terminal ends of the project. Beach fill transitions and tapers have been added to the optimum NED plan as engineering features. These fill tapers are included to minimize fill loss rates at the terminal ends of the project thus reducing the overall average annual cost of maintaining the project. The details of all the engineering components of the plan are included in Appendix B.

D-63. The details of the cost to reconstruct the optimal configuration of the authorized project are presented in Appendix B. For the purposes of evaluation the future project components, it is assumed that current sand prices and availability apply. That is, it is assumed that no immediate sand resources are available to the Segment III shoreline and future sand will be transported from distances greater than 15 miles. The average annual cost of maintaining the design beach over the next 24 years was computed using an interest rate of 6 and 1/8 percent.

D-64. Consideration of the project costs and the primary and secondary benefits associated with the implementation of the reevaluated authorized plan suggest that the project is economically justified. The average annual project cost to build the reevaluated NED plan in 2002 and maintain it over the remainder of the project life is $4,488,000.

MODIFICATIONS TO THE REEVALUATED (NED) PLAN

D-65. Modifications to the authorized project are proposed to reduce the overall average annual project costs. The proposed modifications include (1) the construction of a full design section along the Dania and southern John U. Lloyd shorelines, (2) the construction of groins along the northernmost end of John U. Lloyd, and (3) the implementation of sand bypassing at Port Everglades. The benefits and comparative costs of each of the proposed modifications relative to the reevaluated NED plan are outlined in the following paragraphs. Details of the physical components and expected performance of each of these project modifications are discussed in Appendix B.

Fill Dania Beach Gap (R-94 to R-101)

D-66. The previously constructed beach fills along John U. Lloyd and Hollywood/ Hallandale Beach experienced high sand loss rates at the terminal points of the fill in south John U. Lloyd and north Hollywood. End losses were particularly prominent during the first year after construction and are largely attributable to dramatic planform equilibration caused by inadequate fill transitions. The currently authorized project does not specifically include a project element that addresses the terminal ends of the fill sections. Beach fill tapers, however, have been added to the NED plan as an engineering feature for purposes of reducing the effects of fill end losses.

D-67. An alternative method by which to reduce endlosses from the southern end of the John U. Lloyd project reach and the northern end of the Hollywood/Hallandale project reach would be to construct a continuous design section between the two projects, thereby eliminated the terminal ends of those project reaches. This would consist of

placing a full design section between R-94 and R-101. Considering that the optimum design berm widths along the adjacent reaches, the berm between R-94 and R-101 is widened accordingly. The results of a berm that transitions uniformly between 0 and 50-ft. Berm widths of narrower or wider dimensions would require complicated transition sections.

D-68. Creation of a design section along this reach of shoreline would potentially produce additional storm damage reduction, loss of land, and recreational benefits for the project. Likewise, the addition of this project reach would increase the overall average annual project costs. To evaluate the economic efficiency of this proposed project modification, the incremental primary benefits and costs over the remaining 24-years of the project life are compared. If the incremental primary benefits are greater than the incremental project costs, then the modification would be economically feasible. The average annual project costs and benefits used to evaluate modifications to the reevaluated NED plan are based upon a percent rate of 6 and 1/8 for the remaining 24 years of the project life.

D-69. The incremental additional sand volume required to construct a transitional design beach with advance nourishment would be approximately 360,000 cubic yards. It is estimated that a fill of these dimensions would cover about 13 acres of nearshore hardbottom in southern John U. Lloyd and Dania Beach areas.

D-70. Project Costs. The total average annual cost to implement the reevaluated plan with a fill section between R-94 and R-101 is $5,206,000. This results in an incremental increase in average annual project costs over implementation of the reevaluated NED plan of $735,000. The details of this cost estimate are included in Sub-appendix B-5.

D-71. Benefits. The total average annual incremental primary benefit (i.e., storm damage reduction and loss of land) to implement the reevaluated plan with a fill section between R-94 and R-101 is $328,000. A copy of the input file for computing the storm damage estimates along this reach of shoreline is included in Sub-appendix D-4.

D-72. Summary. Comparison of the incremental average annual costs and benefits for the above described project modifications yields a net average annual benefit deficit of $407,000. Thus, the incremental primary benefits do not equate to at least 50 percent of the incremental cost to implement the additional project reach. Therefore, this project modification is not economically justified. Furthermore, the additional impact of 13 acres of nearshore hardbottom that would be associated with the project modifications is considered to be unnecessary considering the predicted performance and comparable minimal hardbottom impacts of beach fill tapers. Therefore, this project modification is not is not recommended at this time.

Groin Field In Northern John U. Lloyd

D-73. Modifications to the Segment III authorized project are also proposed for the northernmost shoreline along John U. Lloyd Beach State Recreation Area. To date, only

advance fill has been placed in attempt to offset the erosion rate immediate to this area. Advance fill volumes placed during the projects, however, have not provided long-term protection of the design beach section at that location. In fact, the design section along the northern 2,800 feet of the John U. Lloyd shoreline has been impacted by shoreline recession within the first two years following construction of both the 1977 and 1989 projects.

D-74. In addition to advance fill, a measure to reduce the sand loss rate from the northern John U. Lloyd shoreline included sand tightening the south jetty as part of the 1989 renourishment project. Although the jetty sand-tightening most likely reduced the sand loss rate to the inlet, the shoreline immediately downdrift of the inlet continued to erode more or less at historical rates. This may suggest that the sand loss rates to the inlet were relatively low compared to alongshore and offshore sand losses prior to the sand-tightening project.

D-75. Project configurations considered in the engineering analysis (Appendix B) intended to address the erosion problem along the northern John U. Lloyd shoreline included (1) advance fill only, (2) 2 groins with advance fill and, (3) 10 groins with advance fill. The location and quantity of advance fill for each alternative was configured to maximize protection of the design beach while minimizing the quantity of advance fill. The two-groin alternative was configured so as to stabilize the northernmost 700 feet of shoreline where the net sand transport potential is to the north. The 10-groin alternative was configured to stabilize the entire reach of shoreline defined by the largest measured shoreline recession and the steepest gradient in alongshore sand transport potential (i.e., about 2,800 feet immediate to the inlet).

D-76. Two Groins. The two-groin alternative would include the construction of two, rubble mound T-head groins within 700 feet of the Port Everglades south jetty and a spur attached to the south jetty. The configuration would address the shoreline instabilities associated with the net northerly sand transport potential along this reach of shoreline.

D-77. The total average annual cost to implement the modified reevaluated plan with tapers and two groins is $4,429,000. Project costs required to implement the reevaluated authorized project were formulated using a percent rate of 6 and 1/8 for the remaining 24 years of the project life.

D-78. Ten Groins. For completeness, a ten-groin alternative is also considered to extend the shore stabilizing features of a structural field throughout the most highly erosional section of shoreline. The purpose and physical benefit of the extended groin field would be to stabilize the most highly erosional section of shoreline and apply advance fill along areas of shoreline with lower net longshore sand transport potential (i.e., south of a point some 2,800 feet south of the inlet). The ten-groin alternative would include ten T-head groins placed along about 2,800 feet of shoreline and a jetty spur. The alongshore extent of the groin field was developed to be consistent with the limits of the most highly erosional section of shoreline. Stabilizing this northern reach of shoreline with T-head

groins would allow the placement of advance fill beyond the direct of the influence of the inlet.

D-79. The total average annual cost to implement the modified reevaluated plan with tapers and ten groins is $4,432,000. Project costs required to implement the reevaluated authorized project were formulated using a percent rate of 6 and 1/8 for the remaining 24 years of the project life.

D-80. Although the ten-groin alternative demonstrates a net economic benefit (i.e., cost reduction) over the two-groin alternative, it is currently the position of the State of Florida's Department of Environmental Protection and Department of Parks and Recreation (the upland land owner) that structural stabilization of the northern 2,800 feet of the John U. Lloyd Beach State Recreation Area shoreline is not in the best interest of the State and would not be permitted at this time. Nonetheless, the results of this analysis demonstrate the physical and economic benefits of this project configuration. However, without the consent of the State of Florida, this alternative cannot be considered for implementation.

Mechanical Sand Bypassing at Port Everglades

D-81. Cost-effective sand sources for Segment III beach renourishment will become more important in the future as nearby offshore sand deposits are depleted. One alternative future sand source is sand bypassing at Port Everglades. Although the economic benefit of sand bypassing is often related to reduced maintenance at navigation projects, sand bypassing at Port Everglades would provide both physical and economic benefits to the Segment III Federal Shore Protection Project. The physical benefits would include access to a reliable future sand source that is compatible with the native sediments of the Segment III shoreline and reduced sand shoaling within the Port Everglades navigation project. These latter benefits are not considered in this analysis. The economic benefits would include an overall reduction in the cost to maintain the Segment III project. The results of the engineering analyses included in Appendix B demonstrate the physical benefit of sand bypassing at Port Everglades.

D-82. Costs. The project cost associated with implementation of a sand bypass operation at Port Everglades would include the initial capital layout for the sand bypassing infrastructure, inlet jetty, shoreline and shoal modifications, and the annual cost to bypass sand and maintain the bypassing equipment. For the purposes of this investigation it is assumed that annual maintenance cost are incorporated in the unit cost of bypassed sand. The cost to construct the sand-bypassing infrastructure would include the bypassing equipment and any modifications to the inlet's jetties and sand trapping areas and any modification to the proposed groin field.

D-83. It is assumed that the initial cost to construct the sand-bypassing infrastructure would be approximately $7,000,000. This estimate is based upon the assumption that some form of plant infrastructure would be purchased or constructed for site specific use. A more detailed evaluation of the most feasible bypassing physical plant should be

conducted prior to implementation of the operation. For the purposes of this evaluation, however, this estimate is considered conservatively high compared to estimates outlined in the Port Everglades Inlet Management Plan (Coastal Tech., 1994). The unit cost of bypassed sand once the bypassing infrastructure is in place and operational is assumed to be about $3.50 per cubic yard. For the purposes and planning, it is assumed that the sand bypassing plant infrastructure and the physical benefits of sand bypassing would be available at year 6 of the analysis.

D-84. The total average annual cost to implement the Segment III Federal shore protection project over the remaining 24 years of the project life cycle with bypassing at Port Everglades and two groins is estimated to be $4,287,000. The cost reduction over the no-bypassing, two-groin plan would be $142,000 per year. The cost reduction over the reevaluated NED plan would be $184,000 per year. The computed cost savings would be due to the lower unit cost of bypassed sand compared to the expected cost of future off-site sand resources. The details of the cost estimate for these plans are included in Sub-Appendix B-6.

SUMMARY OF THE RECOMMENDED MODIFIED PLAN

D-85. Based upon the average annual costs of alternate project modifications outlined in Table D-15, it is recommended that the NED plan include reconstruction of the pre-project shoreline at John U. Lloyd and reestablishment of a 50-ft extension of the ECL along the Hollywood/Hallandale shoreline. The plan shall also include 6 years of advance fill along the John U. Lloyd (south jetty of Port Everglades to R-94) and Hollywood/Hallandale Beach (R-101 to R-128) reaches. In addition to the renourishment of those shoreline reaches, it is recommended that beach fill transitions be constructed along the northern end of the Hollywood/ Hallandale reach to reduce endlosses and protect the design section. A two-groin and jetty spur structural field is also recommended for construction along the northern 700 feet of the John U. Lloyd shoreline to stabilize that section of shoreline and reduced sand losses to the Port Everglades.

D-86. It is also recommended that sand bypassing be implemented at Port Everglades following construction of the recommended project to provide an alternative sand source for future maintenance of the Segment III Shore Protection Project. The cost to implementation the Segment III project with the two groins and jetty spur at John U. Lloyd and sand bypassing at Port Everglades would be $4,287,000. This would reduce the average annual cost to implement the Segment III project by $184,000.

Table D-15: Annualized cost summary for project modifications.

Project Plan	AVERAGE ANNUAL COST
Reevaluated NED Plan with Added Beach Fill Tapers	$4,471,000
Modifications to the Authorized Plan (R-94 to R-101) ***	
Design Section along Dania and Southern JUL (R-94 to R-101)	$5,206,000
Modifications to the Authorized Plan (Groin Field)	
Two-Groin Alternative	$4,429,000
Ten-Groin Alternative	$4,432,000
Modifications to the Authorized Plan (Bypassing)	
Two-Groin Alternative with Future Sand Bypassing at Port Everglades	$4,287,000

Notes:

GENERAL: Project benefits are the same for all alternatives included in this table, except for the project that would include a design section between R-94 and R-101 (see note below).

*** This project modification results in increased project costs and primary benefits. The incremental increase in primary benefits, however, is less than the incremental increase in project costs. Thus, this modification is not

REFERENCES

American Automobile Association, Your Driving Costs, AAA Press, 1998.

Bureau of Economic and Business Research, "1998 Florida Statistical Abstract". College of Business Administration, University of Florida, University Presses of Florida, Gainesville, 1998.

Broward County Department of Natural Resource Protection, Technical Report 97-03: Broward County Beaches: An economic Study 1995-96. Broward County DNRP, January 1997.

Department of Natural Resources, Outdoor Recreation in Florida – 1989. Division of Recreation and Parks, Tallahassee, Florida, March 1989.

US Army Corps of Engineers, Broward County, Florida Port Everglades to the South County Line (Segment III) Shore Protection Project – Reevaluation Report Section 934 Study With Environmental Assessment. Jacksonville District, October 1990.

US Army Corps of Engineers, Value of Time Saved for Use in Corps Planning Studies a Review of the Literature and Recommendations. USACE Institute for Water Resources, IWR Report 91-R-12, October 1991.

US Census Bureau, Money Income in the United States 1998. US Department of Commerce, September 1999.

SUB-APPENDIX D-1

Example of Segment III
Storm Damage Model Input Files
(Project Reevaluation)

Hollywood/Hallandale (R101-R128) .rsk file

"Uncertainties Broward COunty Segment III - Hollywood/Hallandale reach"
3.0,"Shorelien position sd"
.100,"Armor cost uncertainty at 95% confidence limit"
.100,"structure value cost uncertainty"
1.0,"sd of setback distance"
.22,"sd of backfill cost per ft^3"
8,"# of storm probablilties"
10
10
10.4
13
12.8
13.2
14.2
3
1,53.8,88.8
2,56.6,94.4
3,60,100
4,0,0
5,0,0
6,0,0
7,0,0
8,0,0
9,0,0
10,0,0
11,0,0
12,0,0
13,56.6,94.4
14,0,0
15,0,0
16,0,0
9999,9999,9999

Hollywood/Hallandale R101-R128 .dat Input File

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R101-R128 broward Segment 3
2001,   50
-4
0       4       8       12      16
20      24      28      32      36
40      44      48      52      56
60      64      68      72      76
80      84      88      92      96
100     104     108     112     116
120     124     128     132     136
140     144     148     152     156
160     164     168     172     176
180     184     188     192     196
8
0       177
0.01    160.5
0.02    129
0.05    90
0.1     80
0.2     71
0.5     58.5
1       33
16
'CSP-SMALL CAPPED       '       625     71      1       1.00    1
'CSP-MEDIUM CAPPED      '       750     75.5    1       1.00    2
'CSP-LARGE CAPPED       '       850     80      1       1.00    3
'CSP-SMALL CAPPED W/TOE '       0       0       1       1.00    4
'CSP-MEDIUM CAPPED W/TOE'       0       0       1       1.00    5
'CSP-LARGE CAPPED W/TOE '       0       0       1       1.00    6
'ROCK REVETMENT-SMALL   '       0       0       1       1.00    7
'ROCK REVETMENT-LARGE   '       0       0       1       1.00    8
'DUMMY                  '       0       0       0       0.00    9
'DUMMY                  '       0       0       0       0.00    10
'DUMMY                  '       0       0       0       0.00    11
'DUMMY                  '       0       0       0       0.00    12
'RUBBLE - SMALL         '       200     75.5    0       0.65    13
'RUBBLE - LARGE         '       0       0       0       1.00    14

'DO NOTHING             '       0       0       0       0.00    15

'ROCK REVETMENT-MEDIUM  '       0       0       0       0.00    16

1.33
'Vacant Lot',0,40,1,15,15,-20,20,120,'VC',-1,0,'100',1
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'MF-Destroyed 514201027510',0,90,1,15,15,120,140,175,'VC',-1,0,'101',1
'MF 514201027480',59724,70,1,1,1,40,140,175,'VC',-1,1,'101',1
'MF 514201027470',52236,70,1,15,15,115,135,150,'VC',-1,1,'101',1
'Beach Access',0,30,1,15,1,-20,30,125,'PC',-1,0,'101',1
'HOUSE 514201027280',92484,80,1,15,1,150,170,210,'VC',-1,0,'101',1
'MF 514201027250',206460,80,1,15,1,130,150,175,'VC',-1,0,'101',1
'Vacant Lot',0,240,1,15,15,-20,30,130,'VC',-1,0,'101',1
'SF 514201026860',74860,80,2,15,1,130,150,175,'VC',-1,0,'101',1
'HOTEL 51420102670',97620,80,2,1,1,45,55,80,'VC',-1,0,'101',1
'Vacant Lot',0,120,1,15,15,-20,45,120,'VC',-1,0,'102',1
'SF 514201026660',174456,80,2,1,1,44,50,113,'VC',-1,0,'102',1
'Beach Access',0,30,1,15,1,-20,40,130,'PC',-1,0,'102',1
'CONDO 514201AA',370500,50,2,1,1,23,41,126,'VC',-1,1,'102',1
'BUILD. 514201029999',200000,50,2,15,1,130,150,240,'VC',-1,1,'102',1
'SF 51401026440',8424,40,1,1,1,42,50,84,'VC',-1,0,'102',1
'SF 51401026430',198492,60,3,1,1,45,60,90,'VC',-1,1,'102',1
'CONDO 514201AC',431472,60,2,15,1,155,175,200,'VC',-1,1,'102',1
'Vacant Lot',0,2695,1,15,15,-20,50,180,'VC',-1,0,'104',1
'MF 514201024600',277392,50,2,15,1,92,112,28,'VC',-1,0,'105',1
'MF 514201024590',268284,100,2,15,1,116,136,165,'VC',-1,0,'105',1
'Vacant Lot',0,385,1,15,15,-20,50,230,'VC',-1,0,'105',1
'DUPLEX 514201024250',288700,150,2,1,1,42,115,175,'VC',-1,0,'105',1
'SF 514201024320',99684,100,2,1,1,41,130,180,'VC',-1,0,'105',1
'Vacant Lot',0,485,1,15,15,-20,50,240,'VC',-1,0,'106',1
'HOUSEREST 514201024241',362700,1530,2,15,1,95,115,175,'VC',-1,1,'106',1
'Roadway',48195,1530,1,15,1,72,92,106,'PC',-1,1,'106',1
'Beach Access',0,45,1,15,1,-20,120,200,'PC',-1,1,'106',1
'Roadway',1418,45,1,15,1,60,80,94,'PC',-1,1,'106',1
'MF 514212021350',154000,75,2,15,1,90,110,150,'VC',-1,1,'107',1
'Roadway',2363,75,1,15,1,60,80,94,'PC',-1,1,'107',1
'MF 214212021360',264156,80,2,15,1,90,110,145,'VC',-1,1,'108',1
'Roadway',2520,80,1,15,1,56,76,90,'PC',-1,1,'108',1
'Beach Access',0,45,1,15,1,-20,110,200,'PC',-1,1,'108',1
'Roadway',1418,45,1,15,1,56,76,90,'PC',-1,1,'108',1
'MF 514212021270',74352,40,2,15,1,90,110,145,'VC',-1,1,'108',1
'Roadway',1260,40,1,15,1,56,76,90,'PC',-1,1,'108',1
'MF 514212021280',177624,37,2,15,1,90,110,140,'VC',-1,1,'108',1
'Roadway',1166,37,1,15,1,55,75,89,'PC',-1,1,'108',1
'MF 514212021290',183100,95,2,15,1,95,115,145,'VC',-1,1,'108',1
'Roadway',2993,95,1,15,1,55,75,89,'PC',-1,1,'108',1
'Beach Access',0,35,1,15,1,-20,105,200,'PC',-1,1,'108',1
'Roadway',1103,35,1,15,1,55,75,89,'PC',-1,1,'108',1
'CONDO 514212CG',3067027,165,2,15,1,88,108,153,'VC',-1,1,'108',1
'Roadway',5198,165,1,15,1,55,75,89,'PC',-1,1,'108',1
'Beach Access',0,40,1,15,1,-20,110,200,'PC',-1,1,'108',1
'Roadway',1260,40,1,15,1,55,75,89,'PC',-1,1,'108',1

'CONDO 514212CG-same-',766757,45,2,15,1,90,110,150,'VC',-1,1,'108',1
'Roadway',1418,45,1,15,1,55,75,89,'PC',-1,1,'108',1
'CONDO 514212AK',905544,100,2,15,1,112,132,152,'VC',-1,1,'108',1
'Roadway',3150,100,1,15,1,55,75,89,'PC',-1,1,'108',1
'Beach Access',0,60,1,15,1,-20,110,200,'PC',-1,1,'108',1
'Roadway',1890,60,1,15,1,55,75,89,'PC',-1,1,'108',1
'CONDO 514212AC',19484136,152,15,15,1,116,136,252,'VC',-1,1,'108',1
'Roadway',4788,152,1,15,1,55,75,89,'PC',-1,1,'108',1
'Beach Access',0,68,1,15,1,-20,110,190,'PC',-1,1,'108',1
'Roadway',2142,68,1,15,1,55,75,89,'PC',-1,1,'108',1
'PARKING LOT',14400,80,1,15,1,88,108,140,'VC',-1,1,'108',1
'MF 514212020940',75768,80,1,15,1,85,105,240,'VC',-1,1,'108',1
'Roadway',2520,80,1,15,1,55,75,89,'PC',-1,1,'108',1
'Parking Lot',16020,89,1,15,1,85,105,138,'VC',-1,1,'108',1
'Roadway',2804,89,1,15,1,55,75,89,'PC',-1,1,'108',1
'Beach Access',0,30,1,15,1,-20,105,190,'PC',-1,1,'108',1
'Roadway',945,30,1,15,1,50,70,84,'PC',-1,1,'108',1
'SF 514212020670',40488,78,2,15,1,85,105,140,'VC',-1,1,'109',1
'Roadway',2457,78,1,15,1,50,70,84,'PC',-1,1,'109',1
'MF 514212020680',210072,95,3,15,1,83,103,140,'VC',-1,1,'109',1
'Roadway',2993,95,1,15,1,50,70,84,'PC',-1,1,'109',1
'Beach Access',0,37,1,15,1,-20,105,190,'PC',-1,1,'109',1
'Roadway',1166,37,1,15,1,51,71,85,'PC',-1,1,'109',1
'HOTEL 514212020540',497232,180,3,15,1,88,108,149,'VC',-1,1,'109',1
'Roadway',5670,180,1,15,1,55,75,89,'PC',-1,1,'109',1
'Beach Access',0,35,1,15,1,-20,110,200,'PC',-1,1,'109',1
'Roadway',1103,35,1,15,1,60,80,94,'PC',-1,1,'109',1
'SF 514212020470',161376,40,1,15,1,90,110,145,'VC',-1,1,'109',1
'Roadway',1260,40,1,15,1,60,80,94,'PC',-1,1,'109',1
'SF 514212020472',80820,40,1,15,2,90,110,150,'VC',-1,1,'109',1
'Roadway',1260,40,1,15,1,65,85,99,'PC',-1,1,'109',1
'SF 514212020473',94296,40,1,15,2,90,110,150,'VC',-1,1,'109',1
'Roadway',1260,40,1,15,1,65,85,99,'PC',-1,1,'109',1
'MF 514212020474',37608,50,1,15,2,95,115,150,'VC',-1,1,'109',1
'Roadway',1575,50,1,15,1,65,85,99,'PC',-1,1,'109',1
'Beach Access',0,30,1,15,1,-20,120,200,'PC',-1,1,'109',1
'Roadway',945,30,1,15,1,66,86,100,'PC',-1,1,'109',1
'COOP 514212NP',1257648,89,4,15,2,98,118,161,'VC',-1,1,'109',1
'Roadway',2804,89,1,15,1,67,87,101,'PC',-1,1,'109',1
'MF 514212020380',574152,90,2,15,1,98,118,158,'VC',-1,1,'109',1
'Roadway',2835,90,1,15,1,69,89,103,'PC',-1,1,'109',1
'Beach Access',0,25,1,15,1,-20,120,200,'PC',-1,1,'109',1
'Roadway',788,25,1,15,1,70,90,104,'PC',-1,1,'109',1
'HOTEL 514212020360',6742728,180,11,15,1,120,140,290,'VC',-1,1,'109',1
'Roadway',5670,180,1,15,1,72,92,106,'PC',-1,1,'109',1
'Beach Access',0,30,1,15,1,-20,120,210,'PC',-1,1,'109',1

'Roadway',945,30,1,15,1,74,94,108,'PC',-1,1,'109',1
'MF 514212011870',904440,130,3,15,2,105,125,165,'VC',-1,1,'110',1
'Roadway',4095,130,1,15,1,75,95,109,'PC',-1,1,'110',1
'MF 514212011880',36240,58,2,15,1,105,125,155,'VC',-1,1,'110',1
'Roadway',1827,58,1,15,1,75,95,109,'PC',-1,1,'110',1
'Beach Access',0,20,1,15,1,-20,125,210,'PC',-1,1,'110',1
'Roadway',630,20,1,15,1,76,96,110,'PC',-1,1,'110',1
'COOP 514212NS',295944,85,2,15,1,105,125,158,'VC',-1,1,'110',1
'Roadway',2678,85,1,15,1,76,96,110,'PC',-1,1,'110',1
'MF 514212011730',114336,98,2,15,1,100,120,168,'VC',-1,1,'110',1
'Roadway',3087,98,1,15,1,75,95,109,'PC',-1,1,'110',1
'Beach Access',0,25,1,15,1,-20,120,210,'PC',-1,1,'110',1
'Roadway',788,25,1,15,1,76,96,110,'PC',-1,1,'110',1
'HOTEL 514212011570',234900,79,2,15,1,105,125,150,'VC',-1,1,'110',1
'Roadway',2489,79,1,15,1,76,96,110,'PC',-1,1,'110',1
'CONDO 514212AD',467460,101,3,15,1,105,125,161,'VC',-1,1,'110',1
'Roadway',3182,101,1,15,1,77,97,111,'PC',-1,1,'110',1
'Beach Access',0,20,1,15,1,-20,130,210,'PC',-1,1,'110',1
'Roadway',630,20,1,15,1,78,98,112,'PC',-1,1,'110',1
'MF 514212011420',200000,70,2,15,1,100,120,168,'VC',-1,1,'110',1
'Roadway',2205,70,1,15,1,79,99,113,'PC',-1,1,'110',1
'MF 514212011440',200000,81,2,15,1,130,150,170,'VC',-1,1,'110',1
'Roadway',2552,81,1,15,1,80,100,114,'PC',-1,1,'110',1
'Vacant Lot',0,32,1,15,1,-20,120,220,'VC',-1,1,'110',1
'Roadway',1008,32,1,15,1,82,102,116,'PC',-1,1,'110',1
'Beach Access',0,30,1,15,1,-20,120,220,'PC',-1,1,'110',1
'Roadway',945,30,1,15,1,85,105,119,'PC',-1,1,'110',1
'CONDO 514212AJ',2755884,175,2,15,2,115,135,175,'VC',-1,1,'110',1
'Roadway',5513,175,1,15,1,89,109,123,'PC',-1,1,'110',1
'Beach Access',0,35,1,15,1,-20,140,220,'PC',-1,1,'110',1
'Roadway',1103,35,1,15,1,95,115,129,'PC',-1,1,'110',1
'CONDO 514212AG',953388,79,2,15,1,125,145,175,'VC',-1,1,'111',1
'Roadway',2489,79,1,15,1,98,118,132,'PC',-1,1,'111',1
'MF 514212011220',283656,97,2,15,2,130,150,185,'VC',-1,1,'111',1
'Roadway',3056,97,1,15,1,100,120,134,'PC',-1,1,'111',1
'Beach Access',0,21,1,15,1,-20,150,240,'PC',-1,1,'111',1
'Roadway',662,21,1,15,1,102,122,136,'PC',-1,1,'111',1
'COOP 514212NN',2028744,105,7,15,2,130,150,190,'VC',-1,1,'111',1
'Roadway',3308,105,1,15,1,105,125,139,'PC',-1,1,'111',1
'MF 514212011050',162444,70,2,15,2,140,160,210,'VC',-1,1,'111',1
'Roadway',2205,70,1,15,1,110,130,144,'PC',-1,1,'111',1
'Beach Access',0,35,1,15,1,-20,160,240,'PC',-1,1,'111',1
'Roadway',1103,35,1,15,1,115,135,149,'PC',-1,1,'111',1
'CONDO 514212AM',1029264,120,4,15,2,145,165,205,'VC',-1,1,'111',1
'Roadway',3780,120,1,15,1,113,133,147,'PC',-1,1,'111',1
'SF 514212010950',15120,55,2,15,1,150,170,200,'VC',-1,1,'111',1

'Roadway',1733,55,1,15,1,120,140,154,'PC',-1,1,'111',1
'Beach Access',0,40,1,15,1,-20,160,250,'PC',-1,1,'111',1
'Roadway',1260,40,1,15,1,125,145,159,'PC',-1,1,'111',1
'CITY PARK 514212029999',20100,110,1,15,1,152,172,218,'PN',-1,1,'111',1
'Roadway',3465,110,1,15,1,128,148,162,'PC',-1,1,'111',1
'Beach Access',0,35,1,15,1,-20,175,260,'PC',-1,1,'111',1
'Roadway',1103,35,1,15,1,131,151,165,'PC',-1,1,'111',1
'REST 514212010780',61176,60,1,15,1,160,180,205,'VC',-1,1,'111',1
'Roadway',1890,60,1,15,1,132,152,166,'PC',-1,1,'111',1
'STORE/OFF 514212010781',94992,30,2,15,1,160,180,210,'VC',-1,1,'111',1
'Roadway',945,30,1,15,1,135,155,169,'PC',-1,1,'111',1
'STORE/OFF 514212010800',63336,38,2,15,1,160,180,210,'VC',-1,1,'111',1
'Roadway',1197,38,1,15,1,138,158,172,'PC',-1,1,'111',1
'MF 514212010810',72816,48,1,15,1,165,185,210,'VC',-1,1,'111',1
'Roadway',1512,48,1,15,1,140,160,174,'PC',-1,1,'111',1
'Beach Access',0,40,1,15,1,-20,180,260,'PC',-1,1,'111',1
'Roadway',1260,40,1,15,1,141,161,175,'PC',-1,1,'111',1
'REST 514212010600',53544,40,1,15,1,165,185,210,'VC',-1,1,'112',1
'Roadway',1260,40,1,15,1,141,161,175,'PC',-1,1,'112',1
'STORE/OFF 514212010610',207564,80,2,15,1,165,185,249,'VC',-1,1,'112',1
'Roadway',2520,80,1,15,1,143,163,177,'PC',-1,1,'112',1
'REST 514212010620',34044,45,1,15,1,165,185,215,'VC',-1,1,'112',1
'Roadway',1418,45,1,15,1,145,165,179,'PC',-1,1,'112',1
'Beach Access',0,40,1,15,1,-20,190,270,'PC',-1,1,'112',1
'Roadway',1260,40,1,15,1,146,166,180,'PC',-1,1,'112',1
'MF 514212010470',350712,165,2,15,2,170,190,225,'VC',-1,1,'112',1
'Roadway',5198,165,1,15,1,149,169,183,'PC',-1,1,'112',1
'Beach Access',0,35,1,15,1,-20,190,270,'PC',-1,1,'112',1
'Roadway',1103,35,1,15,1,150,170,184,'PC',-1,1,'112',1
'REST 514212010300',43944,52,1,15,1,170,190,212,'VC',-1,1,'112',1
'Roadway',1638,52,1,15,1,150,170,184,'PC',-1,1,'112',1
'STORE/OFF 514212101310',74016,45,3,15,1,170,190,219,'VC',-1,1,'112',1
'Roadway',1418,45,1,15,1,145,165,179,'PC',-1,1,'112',1
'STORES 514212010320',194832,85,1,15,1,170,190,220,'VC',-1,1,'112',1
'Roadway',2678,85,1,15,1,143,163,177,'PC',-1,1,'112',1
'Amphitheater',55000,80,1,15,1,110,130,200,'PC',-1,1,'112',1
'Roadway',2520,80,1,15,1,140,160,174,'PC',-1,1,'112',1
'Mini golf 514213010701',784206,380,1,15,2,180,200,310,'PC',-1,1,'113',1
'PARKING LOT',146250,380,1,15,1,162,182,340,'PC',-1,1,'113',1
'Roadway',11970,380,1,15,1,142,162,176,'PC',-1,1,'113',1
'Beach Access',0,30,1,15,1,-20,180,265,'PC',-1,1,'113',1
'Roadway',945,30,1,15,1,148,168,182,'PC',-1,1,'113',1
'HOTEL 514213010710',707340,170,4,15,1,156,176,215,'VC',-1,1,'113',1
'Roadway',5355,170,1,15,1,145,165,179,'PC',-1,1,'113',1
'Beach Access',0,40,1,15,1,-20,170,270,'PC',-1,1,'113',1
'Roadway',1260,40,1,15,1,143,163,177,'PC',-1,1,'113',1

'STORES 514213010880',247188,122,1,15,1,160,180,200,'VC',-1,1,'113',1
'Roadway',3843,122,1,15,1,130,150,164,'PC',-1,1,'113',1
'REST 514213010900',35892,40,2,15,1,175,195,218,'VC',-1,1,'113',1
'Roadway',1260,40,1,15,1,129,149,163,'PC',-1,1,'113',1
'Beach Access',0,38,1,15,1,-20,160,225,'PC',-1,1,'113',1
'Roadway',1197,38,1,15,1,128,148,162,'PC',-1,1,'113',1
'STORES 514213011020',62256,42,1,15,1,142,162,200,'VC',-1,1,'113',1
'Roadway',1323,42,1,15,1,125,145,159,'PC',-1,1,'113',1
'CONDOS 514213AJ',3260388,124,9,15,1,147,167,218,'VC',-1,1,'113',1
'Roadway',3906,124,1,15,1,122,142,156,'PC',-1,1,'113',1
'Beach Access',0,35,1,15,1,-20,170,250,'PC',-1,1,'113',1
'Roadway',1103,35,1,15,1,119,139,153,'PC',-1,1,'113',1
'CONDOS 514213AG',3440808,85,9,15,1,150,170,200,'VC',-1,1,'113',1
'Roadway',2678,85,1,15,1,119,139,153,'PC',-1,1,'113',1
'STORES/OFF 514213011220',359628,80,2,15,1,142,162,192,'VC',-1,1,'114',1
'Roadway',2520,80,1,15,1,113,133,147,'PC',-1,1,'114',1
'Beach Access',0,32,1,15,1,-20,170,240,'PC',-1,1,'114',1
'Roadway',1008,32,1,15,1,110,130,144,'PC',-1,1,'114',1
'STORES/OFF 514213011340',295104,165,2,15,1,145,165,195,'VC',-1,1,'114',1
'Roadway',5198,165,1,15,1,110,130,144,'PC',-1,1,'114',1
'Beach Access',0,42,1,15,1,-20,155,250,'VC',-1,1,'114',1
'Roadway',1323,42,1,15,1,110,130,144,'PC',-1,1,'114',1
'STORES 514213011490',443796,78,2,15,1,140,160,188,'VC',-1,1,'114',1
'Roadway',2457,78,1,15,1,109,129,143,'PC',-1,1,'114',1
'STORES 514213011510',104412,49,1,15,1,140,160,185,'VC',-1,1,'114',1
'Roadway',1544,49,1,15,1,108,128,142,'PC',-1,1,'114',1
'MF 514213011520',45036,39,1,15,2,140,160,182,'VC',-1,1,'114',1
'Roadway',1229,39,1,15,1,105,125,139,'PC',-1,1,'114',1
'Beach Access',0,50,1,15,1,-20,160,240,'PC',-1,1,'114',1
'Roadway',1575,50,1,15,1,105,125,139,'PC',-1,1,'114',1
'CONDO 514213AB',8373120,160,13,3,3,145,165,200,'VC',-1,1,'114',1
'Roadway',5040,160,1,15,1,102,122,136,'PC',-1,1,'114',1
'Beach Access',0,30,1,15,1,-20,160,240,'PC',-1,1,'114',1
'Roadway',945,30,1,15,1,100,120,134,'PC',-1,1,'114',1
'STORES/OFF 514213011870',84228,80,2,15,1,140,160,194,'VC',-1,1,'114',1
'Roadway',2520,80,1,15,1,100,120,134,'PC',-1,1,'114',1
'STORES 514213011890',251424,80,2,15,1,140,160,234,'VC',-1,1,'114',1
'Roadway',2520,80,1,15,1,100,120,134,'PC',-1,1,'114',1
'Beach Access',0,40,1,15,1,-20,155,240,'PC',-1,1,'114',1
'Roadway',1260,40,1,15,1,100,120,134,'PC',-1,1,'114',1
'STORE/REST 514213012070',1000000,158,1,15,1,138,158,230,'VC',-1,1,'114',1
'Roadway',4977,158,1,15,1,100,120,134,'PC',-1,1,'114',1
'Beach Access',0,30,1,15,1,-20,155,240,'PC',-1,1,'114',1
'Roadway',945,30,1,15,1,98,118,132,'PC',-1,1,'114',1
'CONDOS 514213BG',3772560,688,7,1,1,175,200,320,'VC',-1,0,'115',1
'CONDOS 514213BD',8721924,125,14,1,1,152,200,320,'VC',-1,0,'115',1

'Beach Access',0,45,1,15,1,-20,150,230,'PC',-1,0,'115',1
'Sea Horse 514213CA',2374584,161,3,15,1,130,150,180,'VC',-1,1,'115',1
'Roadway',5072,161,1,15,1,106,126,140,'PC',-1,1,'115',1
'Beach Access',0,42,1,15,1,-20,155,240,'PC',-1,1,'115',1
'Roadway',1323,42,1,15,1,105,125,139,'PC',-1,1,'115',1
'MF 514213012460',392256,79,2,15,1,135,155,216,'VC',-1,1,'116',1
'Roadway',2489,79,1,15,1,107,127,141,'PC',-1,1,'116',1
'COOP 514213NP',744552,85,3,15,1,145,165,185,'VC',-1,1,'116',1
'Roadway',2678,85,1,15,1,108,128,142,'PC',-1,1,'116',1
'Beach Access',0,40,1,15,1,-20,155,235,'PC',-1,1,'116',1
'Roadway',1260,40,1,15,1,109,129,143,'PC',-1,1,'116',1
'CONDOS 514213AK',1390728,159,3,15,1,135,155,185,'VC',-1,1,'116',1
'Roadway',5009,159,1,15,1,109,129,143,'PC',-1,1,'116',1
'Beach Access',0,40,1,15,1,-20,154,240,'PC',-1,1,'116',1
'Roadway',1260,40,1,15,1,109,129,143,'PC',-1,1,'116',1
'Vacant Lot',0,80,1,15,1,-20,155,240,'VC',-1,1,'116',1
'Roadway',2520,80,1,15,1,109,129,143,'PC',-1,1,'116',1
'SF 514213012880',28884,40,1,15,1,168,188,210,'VC',-1,1,'116',1
'Roadway',1260,40,1,15,1,109,129,143,'PC',-1,1,'116',1
'MF 514213012890',30636,35,2,15,1,145,165,188,'VC',-1,1,'116',1
'Roadway',1103,35,1,15,1,109,129,143,'PC',-1,1,'116',1
'Beach Access',0,50,1,15,1,-20,140,230,'PC',-1,1,'116',1
'Roadway',1575,50,1,15,1,100,120,134,'PC',-1,1,'116',1
'CONDOS 514213BH',4861560,158,7,15,1,130,150,234,'VC',-1,1,'116',1
'Roadway',4977,158,1,15,1,75,95,109,'PC',-1,1,'116',1
'Beach Access',0,35,1,15,1,-20,140,230,'PC',-1,1,'116',1
'Roadway',1103,35,1,15,1,75,95,109,'PC',-1,1,'116',1
'SF 514213013250',43272,35,1,15,1,120,140,170,'VC',-1,1,'117',1
'Roadway',1103,35,1,15,1,75,95,109,'PC',-1,1,'117',1
'SF 514213013260',23280,40,2,15,1,120,140,165,'VC',-1,1,'117',1
'Roadway',1260,40,1,15,1,75,95,109,'PC',-1,1,'117',1
'SF 514213013270',89088,25,2,15,1,135,155,175,'VC',-1,1,'117',1
'Roadway',788,25,1,15,1,75,95,109,'PC',-1,1,'117',1
'SF 514312013271',85932,40,2,15,1,132,152,175,'VC',-1,1,'117',1
'Roadway',1260,40,1,15,1,75,95,109,'PC',-1,1,'117',1
'SF 514213013280',82776,20,3,15,1,160,180,170,'VC',-1,1,'117',1
'Roadway',630,20,1,15,1,75,95,109,'PC',-1,1,'117',1
'Beach Access',0,38,1,15,1,-20,130,200,'PC',-1,1,'117',1
'Roadway',1197,38,1,15,1,75,95,109,'PC',-1,1,'117',1
'SF 514213013440',68616,38,2,15,1,112,132,161,'VC',-1,1,'117',1
'Roadway',1197,38,1,15,1,75,95,109,'PC',-1,1,'117',1
'Vacant Lot',0,40,1,15,1,-20,125,200,'VC',-1,1,'117',1
'Roadway',1260,40,1,15,1,75,95,109,'PC',-1,1,'117',1
'SF 514213013460',114232,78,2,15,1,102,122,168,'VC',-1,1,'117',1
'Roadway',2457,78,1,15,1,75,95,109,'PC',-1,1,'117',1
'Beach Access',0,28,1,15,1,-20,120,200,'PC',-1,1,'117',1

'Roadway',882,28,1,15,1,75,95,109,'PC',-1,1,'117',1
'COOP 514213NR',2846400,165,6,3,3,120,120,160,'VC',-1,1,'117',1
'Roadway',5198,165,1,15,1,75,95,109,'PC',-1,1,'117',1
'PARKING LOT',108000,1165,1,15,1,90,110,150,'VC',-1,0,'117',1
'CASA LA PLAYA 514224CR',716292,178,2,1,1,92,92,148,'VC',-1,0,'118',1
'Beach Access',0,30,1,15,1,-20,95,195,'PC',-1,0,'118',1
'COOP 514224NP',2333424,128,2,13,13,93,110,152,'VC',-1,0,'118',1
'Vacant Lot',0,45,1,15,1,-20,95,195,'VC',-1,0,'118',1
'Beach Access',0,38,1,15,1,-20,100,200,'PC',-1,0,'118',1
'CONDOS 514224CA',2754312,74,3,1,1,94,100,145,'VC',-1,0,'118',1
'MF 514224020190',161292,87,2,1,1,86,100,151,'VC',-1,0,'119',1
'Beach Access',0,25,1,15,1,-20,100,200,'PC',-1,0,'119',1
'PARKING LOT',1800,80,1,1,1,96,100,160,'VC',-1,0,'119',1
'SHORE VIEW 514224020230',369600,85,2,1,1,96,100,155,'VC',-1,0,'119',1
'Beach Access',0,30,1,15,1,-20,100,205,'PC',-1,0,'119',1
'COOP 514224NR',2406132,165,4,1,1,102,105,160,'VC',-1,0,'119',1
'Beach Access',0,40,1,15,1,-20,110,220,'PC',-1,0,'119',1
'MF 514224020360',310428,81,3,1,1,102,110,170,'VC',-1,0,'119',1
'MF 514224020350',163224,85,2,1,1,110,115,171,'VC',-1,0,'119',1
'Beach Access',0,28,1,15,1,-20,105,220,'PC',-1,0,'119',1
'CONDOS 514224BG',6789024,174,7,1,1,110,110,180,'VC',-1,0,'120',1
'Beach Access',0,21,1,15,1,-20,110,225,'PC',-1,0,'120',1
'MF 514224020460',226596,95,2,1,1,112,115,180,'VC',-1,0,'120',1
'MF 514224020450',169980,85,2,1,1,112,118,170,'VC',-1,0,'120',1
'Beach Access',0,35,1,15,1,-20,111,230,'PC',-1,0,'120',1
'FOX GLOVE 514224029999',29600,80,1,3,3,106,110,168,'VC',-1,1,'120',1
'514224BH',7149662,80,28,15,15,270,290,350,'VC',-1,1,'120',1
'CONDOS 514224BH',7399662,395,28,3,3,123,162,228,'VC',-1,1,'120',1
'SAME CONDOS BLDG #2',7149662,395,28,15,15,362,382,462,'VC',-1,1,'120',1
'RESTROOM 514224020640',25000,90,1,3,3,119,120,148,'PC',-1,0,'120',1
'Beach Access',0,45,1,15,1,-20,190,300,'PC',-1,0,'120',1
'PRESIDENTIAL 514224010400',20188188,352,16,3,3,68,68,290,'VC',-1,0,'120',1
'HOLIDAY INN 514224010401',8019804,245,5,3,3,39,55,260,'VC',-1,0,'120',1
'CONDOS BLDG #1 514224BB',16860902,250,18,1,1,25,45,170,'VC',-1,1,'121',1
'BUILDING #2',16610902,250,18,15,15,285,305,418,'VC',-1,1,'121',1
'PARKING LOT',79650,120,1,1,1,30,28,170,'VC',-1,0,'121',1
'AQUARIUS 514224010420',14732190,238,15,2,2,32,35,320,'VC',-1,0,'121',1
'OCEAN VIEW 514224010430',4382364,240,5,1,1,36,35,215,'VC',-1,0,'121',1
'ALEXANDER 514224010450',14287800,281,15,1,1,39,35,285,'VC',-1,0,'121',1
'NEW CON. 514224010480',22000000,925,18,2,2,45,82,441,'VC',-1,0,'122',1
'SEA AIR T 514226010010',22845200,210,16,3,3,63,85,285,'VC',-1,0,'123',1
'MF 514226000020',13914542,220,15,15,15,170,190,350,'VC',-1,1,'123',1
'PARKING LOT',79650,220,1,2,2,70,75,221,'VC',-1,1,'123',1
'POOL',250000,220,1,2,2,55,120,121,'VC',-1,0,'123',1
'PARKING LOT ABOVE',79650,105,1,2,2,50,60,195,'VC',-1,0,'123',1
'MF 514226000030',13706378,105,15,2,2,50,170,335,'VC',-1,0,'123',1

'POOL',250000,80,1,2,2,50,72,73,'VC',-1,0,'123',1
'Vacant Lot 514226010180',0,65,1,2,2,50,50,200,'VC',-1,0,'123',1
'INDIGO 514226010130',339564,150,2,15,15,52,72,135,'VC',-1,1,'124',1
'POOL',150000,150,1,1,1,71,78,79,'VC',-1,1,'124',1
'PUBLIC BEACH 514226010170',11880,504,1,15,1,20,40,150,'PN',-1,0,'124',1
'CITY BEACH',0,1077,1,15,15,-20,0,300,'PN',-1,0,'124',1
'LE MER 514226CB',18102672,188,22,1,1,0,55,130,'VC',-1,0,'125',1
'LE MER 514226BC',14473210,110,22,15,15,180,200,280,'VC',-1,1,'125',1
'POOL',250000,110,1,1,1,0,30,31,'VC',-1,1,'125',1
'PARKING LOT',29363,120,1,2,2,0,10,165,'VC',-1,0,'125',1
'TENNIS COURT 514226CJ',150000,78,1,2,2,0,5,70,'VC',-1,1,'125',1
'514224CJ',11363920,78,20,2,2,0,150,220,'VC',-1,1,'125',1
'POOL 514226CJ',250000,95,1,2,2,0,10,11,'VC',-1,1,'125',1
'MALAYA 514226CJ',11363920,95,20,15,15,133,153,400,'VC',-1,1,'125',1
'BILTMORE MANSION 514226HB',3842412,128,4,15,1,2,22,240,'VC',-1,0,'126',1
'TAROMINA 514226NV',4532264,95,4,1,1,0,70,262,'VC',-1,0,'126',1
'POOL',100000,55,1,1,1,0,5,6,'VC',-1,0,'126',1
'PARKING LOT',43312,65,1,1,1,0,15,270,'VC',-1,0,'126',1
'THE HEMISPHERES #1 514226BH',30717289,92,23,1,1,11,65,205,'VC',-1,0,'126',1
'POOL',250000,139,1,2,2,0,5,6,'VC',-1,0,'126',1
'BLDG',5000000,168,1,2,2,0,5,95,'VC',-1,0,'126',1
'PARKING LOT',85950,175,1,2,2,0,55,140,'VC',-1,1,'126',1
'THE HEMISPHERES #2 514226BH',30717289,175,23,15,15,220,240,400,'VC',-
1,1,'127',1
'REGENCY 514226GH',2130480,111,3,1,1,0,20,130,'VC',-1,0,'127',1
'CONDOS 514226BE',49398695,299,22,15,15,170,190,315,'VC',-1,1,'127',1
'PLOT & POOL',279925,299,1,2,2,2,5,6,'VC',-1,1,'127',1
'HOTEL 514226020220',581796,95,2,3,3,44,68,512,'VC',-1,0,'127',1
'HOTEL 514226020350',567156,175,2,15,15,95,115,520,'VC',-1,1,'127',1
'POOL',250000,175,1,1,1,35,35,36,'VC',-1,1,'127',1
'COOP 514226NW',4382264,140,8,15,15,42,62,260,'VC',-1,1,'127',1
'POOL',250000,140,1,2,2,0,0,1,'VC',-1,1,'127',1
'PARKING LOT 514226DC',22950,175,1,2,2,0,15,115,'VC',-1,1,'127',1
'CONDO 514226DC',21275594,175,25,15,15,150,170,275,'VC',-1,1,'127',1
'POOL ',250000,175,1,2,2,0,35,36,'VC',-1,1,'127',1
'CONDO 514226DA',27371471,225,16,15,15,80,100,225,'VC',-1,1,'128',1
'PARKING LOT',113125,225,1,2,2,0,0,120,'VC',-1,1,'128',1
'POOL',250000,125,1,2,2,0,90,91,'VC',-1,0,'128',1

SUB-APPENDIX D-2

Example of Segment III
Storm Damage Model Input Files

John U. Lloyd Reach Evaluation
(South Jetty to R-94)

John U. Lloyd Jetty to R-94 .rsk File

"Uncertainties Broward County Segment III - JUL reach"
8.0,"Shorelien position sd"
.100,"Armor cost uncertainty at 95% confidence limit"
.100,"structure value cost uncertainty"
1.0,"sd of setback distance"
.22,"sd of backfill cost per ft^3"
8,"# return periods"
16
14.9
13.4
10.7
9.9
9.9
10
2
1,39,65
2,43.9,73.1
3,48.8,81.3
4,0,0
5,0,0
6,0,0
7,0,0
8,0,0
9,5000,5000
10,5000,5000
11,0,0
12,0,0
13,43.9,73.1
14,0,0
15,0,0
16,0,0
9999,9999,9999

Broward Segment 3, JUL Reach 86-88 - Without Project Condition
2002,25
-10.00
56 66 76 86 96
96 106 116 126 136
136 146 156 166 176
176 186 196 206 216
216 226 236 246 256
8
.00,187
.01,171
.02,148
.05,103
.10,65
.20,52
.50,41
1.0,26.5
16
'CSP-SMALL CAPPED ' 625 52 1 1.00 1
'CSP-MEDIUM CAPPED ' 750 58.5 1 1.00 2
'CSP-LARGE CAPPED ' 850 65 1 1.00 3
'CSP-SMALL CAPPED W/TOE ' 0 0 1 1.00 4
'CSP-MEDIUM CAPPED W/TOE '0 0 1 1.00 5
'CSP-LARGE CAPPED W/TOE ' 0 0 1 1.00 6
'ROCK REVETMENT-SMALL ' 0 0 1 1.00 7
'ROCK REVETMENT-LARGE ' 0 0 1 1.00 8
'Navy facility w/ Project ' 0 5000 1 1.00 9
'DUMMY ' 0 0 0 0.00 10
'DUMMY ' 0 0 0 0.00 11
'DUMMY ' 0 0 0 0.00 12
'RUBBLE - SMALL ' 200 58.5 0 0.65 13
'RUBBLE - LARGE ' 0 0 0 1.00 14

'DO NOTHING ' 0 0 0 0.00 15

'ROCK REVETMENT-MEDIUM ' 0 0 0 0.00 16
1.33
'Radar Station ',2125000,350,1,1,1,29,30,60,'PN',-1,0,'86',1
'Boardwalk',212000,190,1,15,15,130,150,155,'PN',-1,0,'86',1
'B-room',24000,90,1,15,15,160,180,210,'PN',-1,0,'86',1
'Vacant Lot',0,670,1,15,15,-20,130,250,'PN',-1,0,'86',1
'Parking Lot',83025,282,1,15,15,175,195,305,'PN',-1,0,'87',1
'B-room',24000,113,1,15,15,170,190,230,'PN',-1,1,'87',1
'Parking Lot',45765,113,1,15,15,290,310,400,'PN',-1,1,'87',1
'Parking Lot',153900,380,1,15,15,215,235,340,'PN',-1,0,'88',1
'Vacant Lot',0,355,1,15,15,-20,100,200,'PN',-1,0,'88',1

'B-room',24000,95,1,15,15,160,180,215,'PN',-1,0,'88',1
'Vacant Lot',0,340,1,15,15,-20,100,200,'PN',-1,0,'88',1

R86-R94 Broward Segment 3 - 86-88 with project condition
2002,25
-10.00
56 66 76 86 96
96 106 116 126 136
136 146 156 166 176
176 186 196 206 216
216 226 236 246 256
8
.00,187
.01,171
.02,148
.05,103
.10,65
.20,52
.50,41
1.0,26.5
16
'CSP-SMALL CAPPED ' 625 52 1 1.00 1
'CSP-MEDIUM CAPPED ' 750 58.5 1 1.00 2
'CSP-LARGE CAPPED ' 850 65 1 1.00 3
'CSP-SMALL CAPPED W/TOE ' 0 0 1 1.00 4
'CSP-MEDIUM CAPPED W/TOE '0 0 1 1.00 5
'CSP-LARGE CAPPED W/TOE ' 0 0 1 1.00 6
'ROCK REVETMENT-SMALL ' 0 0 1 1.00 7
'ROCK REVETMENT-LARGE ' 0 0 1 1.00 8
'Navy facility w/ Project ' 0 5000 1 1.00 9
'DUMMY ' 0 0 0 0.00 10
'DUMMY ' 0 0 0 0.00 11
'DUMMY ' 0 0 0 0.00 12
'RUBBLE - SMALL ' 200 58.5 0 0.65 13
'RUBBLE - LARGE ' 0 0 0 1.00 14

'DO NOTHING ' 0 0 0 0.00 15

'ROCK REVETMENT-MEDIUM ' 0 0 0 0.00 16
1.33
'Radar Station ',2125000,350,1,9,9,29,30,60,'PN',-1,0,'86',1
'Boardwalk',212000,190,1,15,15,130,150,155,'PN',-1,0,'86',1
'B-room',24000,90,1,15,15,160,180,210,'PN',-1,0,'86',1
'Vacant Lot',0,670,1,15,15,-20,130,250,'PN',-1,0,'86',1
'Parking Lot',83025,282,1,15,15,175,195,305,'PN',-1,0,'87',1
'B-room',24000,113,1,15,15,170,190,230,'PN',-1,1,'87',1
'Parking Lot',45765,113,1,15,15,290,310,400,'PN',-1,1,'87',1
'Parking Lot',153900,380,1,15,15,215,235,340,'PN',-1,0,'88',1
'Vacant Lot',0,355,1,15,15,-20,100,200,'PN',-1,0,'88',1

'B-room',24000,95,1,15,15,160,180,215,'PN',-1,0,'88',1
'Vacant Lot',0,340,1,15,15,-20,100,200,'PN',-1,0,'88',1

Broward Segment 3, JUL Reach - 89-94 Without&without Project Condition
2002,25
-10.00
0 10 20 30 40
50 60 70 80 90
100 110 120 130 140
150 160 170 180 190
200 210 220 230 240
8
.00,187
.01,171
.02,148
.05,103
.10,65
.20,52
.50,41
1.0,26.5
16
'CSP-SMALL CAPPED ' 625 52 1 1.00 1
'CSP-MEDIUM CAPPED ' 750 58.5 1 1.00 2
'CSP-LARGE CAPPED ' 850 65 1 1.00 3
'CSP-SMALL CAPPED W/TOE ' 0 0 1 1.00 4
'CSP-MEDIUM CAPPED W/TOE '0 0 1 1.00 5
'CSP-LARGE CAPPED W/TOE ' 0 0 1 1.00 6
'ROCK REVETMENT-SMALL ' 0 0 1 1.00 7
'ROCK REVETMENT-LARGE ' 0 0 1 1.00 8
'Navy facility w/ Project ' 0 5000 1 1.00 9
'DUMMY ' 0 0 0 0.00 10
'DUMMY ' 0 0 0 0.00 11
'DUMMY ' 0 0 0 0.00 12
'RUBBLE - SMALL ' 200 58.5 0 0.65 13
'RUBBLE - LARGE ' 0 0 0 1.00 14

'DO NOTHING ' 0 0 0 0.00 15

'ROCK REVETMENT-MEDIUM ' 0 0 0 0.00 16
1.33
'B-room',24000,90,1,15,15,135,155,190,'PN',-1,0,'89',1
'Vacant Lot',0,450,1,15,15,-20,0,200,'PN',-1,0,'89',1
'B-room',24000,150,1,15,15,120,140,160,'PN',-1,0,'89',1
'Vacant Lot',0,3492,1,15,15,-20,0,150,'PN',-1,0,'92',1

SUB-APPENDIX D-3

Details of Recreation Benefit Analysis for
John U. Lloyd Reach Evaluation
(South Jetty to R-94)

JUL Avg. Annual Recreational Benefits

Interest Rate:	6.125%	
Project Life (yrs):	24	
Capital Recovery Factor		0.080601712

Year	Visits Attributable to Project	Benefit ($)	Present Valuation ($)
1	**0**	0	0
2	36,950	143,000	127,000
3	73,901	286,000	239,300
4	110,851	429,000	338,200
5	147,801	572,000	424,900
6	**184,752**	715,000	500,500
7	239,136	925,500	610,500
8	293,520	1,135,900	706,000
9	347,903	1,346,400	788,500
10	402,287	1,556,900	859,200
11	456,671	1,767,300	919,000
12	511,055	1,977,800	969,100
13	565,439	2,188,200	1,010,300
14	619,823	2,398,700	1,043,600
15	674,207	2,609,200	1,069,700
16	**728,591**	2,819,600	1,089,200
17	737,362	2,853,600	1,038,700
18	746,134	2,887,500	990,400
19	754,905	2,921,500	944,200
20	763,677	2,955,400	900,000
21	772,448	2,989,400	857,900
22	781,220	3,023,300	817,500
23	789,991	3,057,300	779,000
24	798,763	3,091,200	742,200
	TOTAL	24-yr	17,764,900
	Annual Equivalent Benefit		$ 1,431,900

SUB-APPENDIX D-4

Example of Segment III
Storm Damage Model Input Files
(Project Modification between R-94 and R-101)

Dania R-94 to R-101 .rsk File

"Uncertainties Broward COunty Segment III - Daina reach"
3.0,"Shorelien position sd"
.100,"Armor cost uncertainty at 95% confidence limit"
.100,"structure value cost uncertainty"
1.0,"sd of setback distance"
.22,"sd of backfill cost per ft^3"
8,"# of storm probablilties"
13
12.5
11.9
11.9
11.4
11.6
12.1
3
1,46.1,76.9
2,50.3,83.8
3,54.4,90.6
4,0,0
5,0,0
6,0,0
7,0,0
8,0,0
9,0,0
10,0,0
11,0,0
12,0,0
13,46.1,76.9
14,0,0
15,0,0
16,0,0
9999,9999,9999

Dania: Broward Segment 3 Input File
2001, 25
-4
0 4 8 12 16
20 24 28 32 36
40 44 48 52 56
60 64 68 72 76
80 84 88 92 96
8
0 182
0.01 165.7
0.02 138.5
0.05 96.5
0.1 72.5
0.2 61.5
0.5 49.8
1 29.8
16
'CSP-SMALL CAPPED ' 625 61.5 1 1.00 1
'CSP-MEDIUM CAPPED ' 750 67 1 1.00 2
'CSP-LARGE CAPPED ' 850 72.5 1 1.00 3
'CSP-SMALL CAPPED W/TOE ' 0 0 1 1.00 4
'CSP-MEDIUM CAPPED W/TOE ' 0 0 1 1.00 5
'CSP-LARGE CAPPED W/TOE ' 0 0 1 1.00 6
'ROCK REVETMENT-SMALL ' 0 0 1 1.00 7
'ROCK REVETMENT-LARGE ' 0 0 1 1.00 8
'DUMMY ' 0 0 0 0.00 9
'DUMMY ' 0 0 0 0.00 10
'DUMMY ' 0 0 0 0.00 11
'DUMMY ' 0 0 0 0.00 12
'RUBBLE - SMALL ' 200 61.5 0 0.65 13
'RUBBLE - LARGE ' 0 0 0 1.00 14

'DO NOTHING ' 0 0 0 0.00 15

'ROCK REVETMENT-MEDIUM ' 0 0 0 0.00 16

1.33
'Pier',0,150,1,15,15,20,40,55,'PN',-1,0,'98',1
'Parking Lot',135450,430,1,15,15,80,100,165,'PN',-1,0,'98',1
'Building',24000,50,1,15,15,50,70,85,'PN',-1,1,'98',1
'parking Lot',14063,50,1,15,15,90,110,175,'PN',-1,1,'98',1
'Parking Lot',146250,500,1,15,15,90,110,175,'PN',-1,0,'99',1
'Building',24000,65,1,15,15,30,50,65,'PN',-1,1,'99',1
'Parking Lot',19012,65,1,15,15,95,115,180,'PN',-1,1,'99',1
'Building',24000,80,1,15,15,65,85,110,'PN',-1,1,'99',1

'Parking Lot',11700,80,1,15,15,115,135,175,'PN',-1,1,'99',1
'Parking Lot',75938,760,1,15,15,65,85,130,'PN',-1,1,'100',1
'SeaTech',1300000,760,2,15,1,160,180,210,'VC',-1,1,'100',1
'New Construction',20000000,610,16,15,15,95,115,225,'VC',-1,0,'100',1